PERFORMANCE BASED ENERGY SAVINGS AGREEMENT

AMENDMENT NO.2

BETWEEN

MCCLURE COMPANY

AND

COUNTY OF YORK

DATED: JUNE 20, 2012

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This Amendment No. 2 ("Amendment" or "Phase III") to the Performance Based Energy Savings Agreement ("Original Agreement" or "Phase I") dated this 20th day of June, 2012, is entered into between MCCLURE COMPANY ("McClure" or "ESCO"), having an address of 4101 North Sixth Street, Harrisburg, Pennsylvania 17110; and the COUNTY OF YORK ("Client" or "County"), having an address of 28 East Market Street, York, PA 17401.

I. BACKGROUND

McClure Company and the County of York previously entered into a contract entitled Performance Based Energy Savings Agreement, dated June 3rd, 2010. Through the Phase I contract, various Facility Improvement Measures were implemented to upgrade County owned facilities and subsequently reduce energy and operational expenses.

The Original Agreement was amended (Amendment No.1) on January 11, 2012. Amendment No. 1 provided additional lighting upgrades, window upgrades and necessary cooling corrections at the County's 911 Center.

The County desires to again amend the Original Agreement as Amendment No. 2 to provide for the addition of further upgrades and subsequent energy and operational savings on the terms set forth herein.

II. AGREEMENT

For good and valuable consideration, and intending to be legally bound hereby, the parties agree as follows:

1. Section II, Paragraphs B, C and D of the Agreement are amended as follows:

B. "**Base Energy Rates**" means those energy rates described on Schedule C and increased each year on a cumulative basis as shown in the table below. This is used by McClure, as set forth in Section V, to calculate the EC Savings for the various EC Measures.

Year	Electric	Gas	Oil	Propane	Water
	Percent Increase Table				
1	4%	4%	N/A	N/A	3%
2	4%	4%	N/A	N/A	3%
3	4%	4%	N/A	N/A	3%
4	4%	4%	N/A	N/A	3%
5	4%	4%	N/A	N/A	3%
6	4%	4%	N/A	N/A	3%
7	4%	4%	N/A	N/A	3%
8	4%	4%	N/A	N/A	3%
9	4%	4%	N/A	N/A	3%
10	4%	4%	N/A	N/A	3%
11	4%	4%	N/A	N/A	3%
12	4%	4%	N/A	N/A	3%
13	4%	4%	N/A	N/A	3%
14	4%	4%	N/A	N/A	3%
15	4%	4%	N/A	N/A	3%
16	4%	4%	N/A	N/A	3%
17	4%	4%	N/A	N/A	3%
18	4%	4%	N/A	N/A	3%
19	4%	4%	N/A	N/A	3%
20	4%	4%	N/A	N/A	3%

C. "**Commencement Date**" means the first day of the month following Substantial Completion of all EC Measures. "Commencement Date" for this Amendment No. 2 shall mean the first day of the month following substantial completion of the EC Measures as further defined in Schedule E.A2, a copy of which is attached to this Amendment No. 2.

D. "**Contract Year**" means each one-year period following the applicable Commencement Date."

2. Section III of the Agreement is amended by the addition of the following subpart C:

C. The EC Measures installed hereunder shall consist of the EC Measures listed on Schedule E attached hereto and the EC Measures listed in Schedule E.A2, a copy of which is attached to this Amendment No. 2.

3. The Compensation to ESCO reflected in Schedule F to the Agreement shall be increased by $6,148,452 as more fully set forth and described in Schedule F.A2, a copy of which is attached to this Amendment No. 2. The payment terms for such additional amounts shall remain as set forth in Section XVII of the Original Agreement.

4. The following Schedules of the Original Agreement shall be supplemented by the Schedules appended to this Amendment No. 2:

- Schedule A by Schedule A.A2, "Client Facilities".
- Schedule B by Schedule B.A2, "Energy Use Base".
- Schedule C by Schedule C.A2, "Base Energy Rates".
- Schedule D by Schedule D.A2,"Guaranteed Energy Savings". The Guaranteed Energy Savings per Contract Year, which sets forth in column 2 thereof the energy savings specifically guaranteed by ESCO for each Contract Year with respect to the EC Measures to be provided by ESCO under this Amendment No. 2;
- Schedule E by Schedule E.A2, "Energy Conservation Measures"
- Schedule F by Schedule F.A2, "Total Project Fee"
- Schedule J by Schedule J.A2, "Material and Maintenance Savings"
- Schedule L by Schedule L.A2, "Measurement and Verification Plan".

5. The following Schedules appended to this Amendment No. 2 shall be added to the Original Agreement:

- Schedule M.A2, "Act 129 Utility Rebate Funds".

6. The following Attachments of the Original Agreement shall be supplemented by the Attachments appended to this amendment No.2:

- Attachment A by Attachment A.A2, "Scope of Work for Energy Conservation Measures"

7. The following Attachments appended to this Amendment No. 2 shall be added to the Original Agreement:

- Attachment B.A2, "Mechanical Service Agreement".

8. Schedules, Attachments and Exhibits designations, as amended above, shall be further referenced as such throughout the amended Agreement. The amended Schedules, Exhibits and Appendices designations are intended to supplement the Original Agreement designations, unless defined otherwise within this Amendment No. 2.

9. The Parties acknowledge that there may be future amendments to the Original Agreement. Such amendments must be agreed to in writing before they become effective.

10. The Original Agreement, as amended by this Amendment No. 2, is the full, valid and binding agreement between ESCO and District with respect to the transactions contemplated therein.

IN WITNESS WHEREOF, the parties have caused their duly authorized representatives to execute and deliver this Amendment No. 2 as of the date first written above.

COUNTY OF YORK

Signature: _____

Name: Steve Chronister

Title: President Commissioner

MCCLURE COMPANY

Signature: _____

Name: Thomas F Brown Jr

Title: President

SCHEDULE A.A2 – CLIENT FACILITIES

The following Client facilities are included in this Program as listed below:

Building Name	Building Number	Area (sq ft)	Building Type
Prison	1	355,956	Penitentiary
Annex (Nursing Home)	2	65,315	Office
Nursing Home	3	248,475	Healthcare
Judicial Center	4	329,238	Office

SCHEDULE B.A2 – ENERGY USE BASE

A Summary of the utility data was provided by York County's utility suppliers through authorization of McClure Company to access historical utility data for analysis in this response. The utility data provided ranges from 1/2009 to 12/2011, covering three years of utility use and costs for most facilities.

Given prior phases that impacted energy use at some of these facilities, the energy baseline for this phase was taken as the calendar year 2011. This baseline is for all facilities in terms of consumption of energy.

For natural gas baseline use at the Nursing Home and Annex, the total gas use of the Nursing Home was divided between the two facilities. The use at the Annex was determined using standard engineering values for operation heating (btu/sf/hr), a set number of heating hours per year, and an assumed system efficiency.

The baseline will be adjusted accordingly to account for differences in weather patterns. See measurement and verification plan at the end of this section for additional clarification.

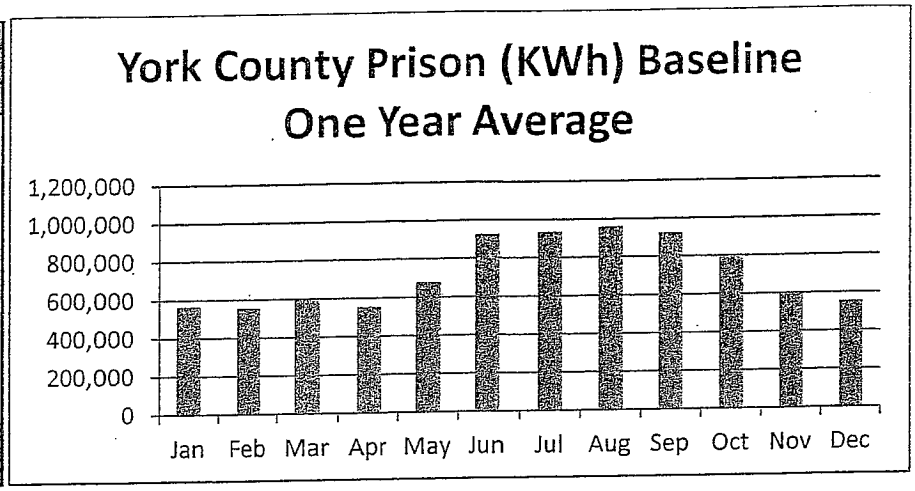
The Energy Use Base may be revised, from time to time, due to any changes in factors that affect energy use at any of the Facilities, as provided in Section VII in the Agreement.

Utility providers and rate structures or pricings are included in the table below.

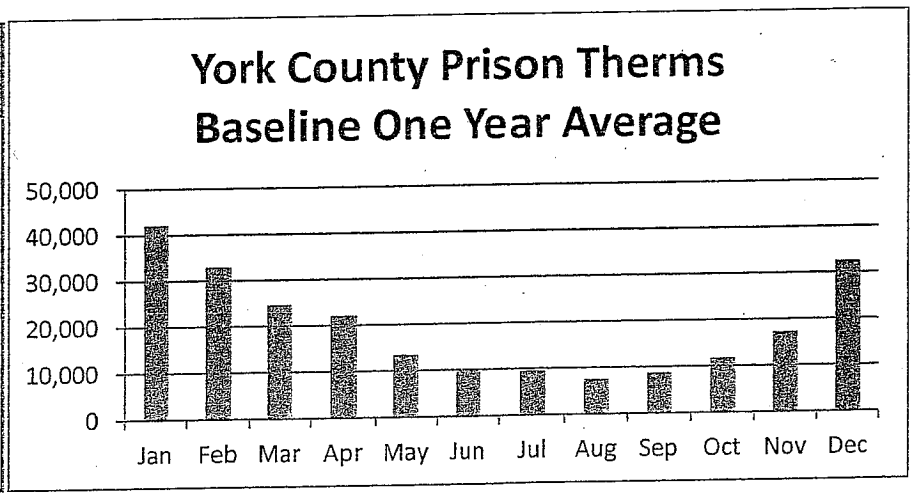
Rate Structure	Site	Vender Name	Account Number	Service
General Secondary Medium	Prison	Met Ed	10 00 19 7065 4 6	Electric
General Secondary Small	Prison	Met Ed	10 00 19 7062 3 1	Electric
General Service Primary	Prison	Met Ed	10 00 74 0272 2 6	Electric
General Service Primary	Prison	Met Ed	10 00 74 0254 2 8	Electric
N/A	Prison	Columbia Gas	12976951 001 000 0	Gas Distribution
N/A	Prison	Columbia Gas	15149213 001 000 9	Gas
N/A	Prison	UGI Energy	COUN500	Gas
N/A	Prison	Columbia Gas	12984514 001 000 6	Tariff Gas
N/A	Prison	Columbia Gas	00002454 000 000 7	GTS Gas
N/A	Prison	York Water	2225-5562	Water
N/A	Prison	York Water	2225-5563	Water
N/A	Prison	York Water	2225-5564	Water
N/A	Prison	York Water	5943-11555	Water
N/A	Prison	Sprigettsbury Township	7022606	Sewer
N/A	Prison	Sprigettsbury Township	7022506	Sewer
General Service Primary	Nursing Home	Met Ed	10 00 21 1542 0 6	Electric
N/A	Nursing Home	UGI Energy	12984476001	Gas
N/A	Nursing Home	Columbia Gas	12984476 001 000 8	Tariff Gas
N/A	Nursing Home	Columbia Gas	00002454 000 000 7	GTS Gas
General Service Primary	Annex (Nursing Home)	Met Ed	10 00 21 1548 6 7	Electric
General Secondary Large	Judicial Center	Met Ed	10 00 48 8235 7 7	Electric
General Secondary Large	Judicial Center	Met Ed	10 00 42 3276 5 8	Electric
	Judicial Center	UGI ES	10347194004	Gas Commodity
	Judicial Center	Columbia	000173580000004	Gas Distribution

Energy Baseline by Building

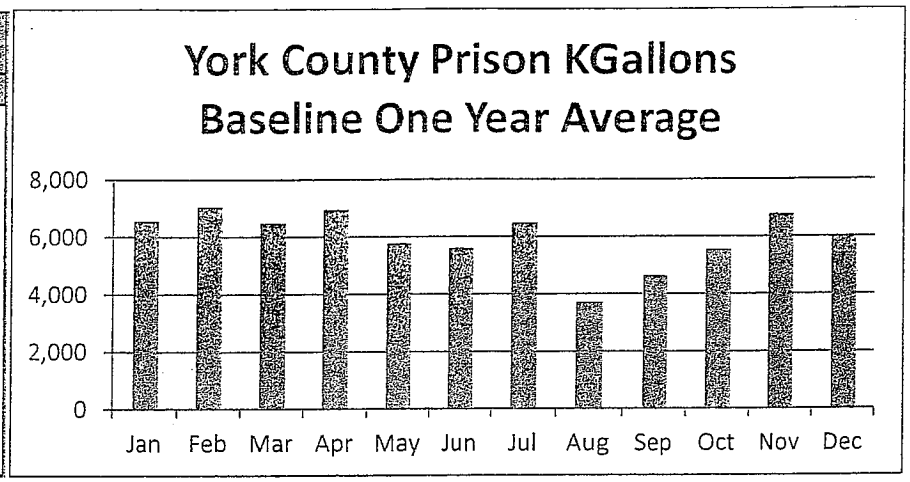
York County Prison (KWh) Baseline One Year Average	
Month	(KWh)
Jan	565,531
Feb	554,870
Mar	593,925
Apr	553,193
May	678,142
Jun	924,507
Jul	934,921
Aug	959,866
Sep	922,384
Oct	793,986
Nov	599,411
Dec	554,632



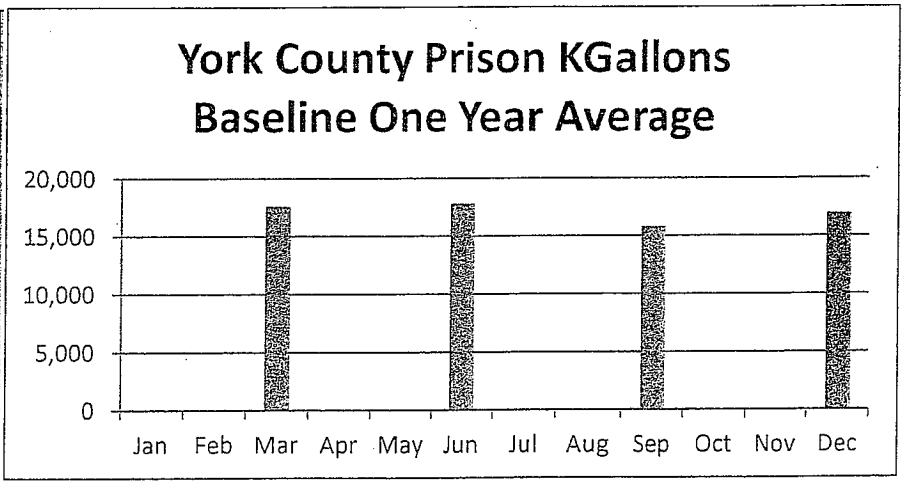
York County Prison Therms Baseline One Year Average	
Month	Therms
Jan	42,110
Feb	32,930
Mar	24,640
Apr	22,090
May	13,410
Jun	9,840
Jul	9,520
Aug	7,490
Sep	8,780
Oct	11,780
Nov	17,260
Dec	30,125



York County Prison KGallons Baseline One Year Average	
Month	KGallons
Jan	6,561
Feb	7,063
Mar	6,492
Apr	6,951
May	5,779
Jun	5,610
Jul	6,490
Aug	3,712
Sep	4,639
Oct	5,548
Nov	6,778
Dec	5,973



York County Prison KGallons Baseline One Year Average	
Month	KGallons
Jan	0
Feb	0
Mar	17,597
Apr	0
May	0
Jun	17,825
Jul	0
Aug	0
Sep	15,812
Oct	0
Nov	0
Dec	16,965

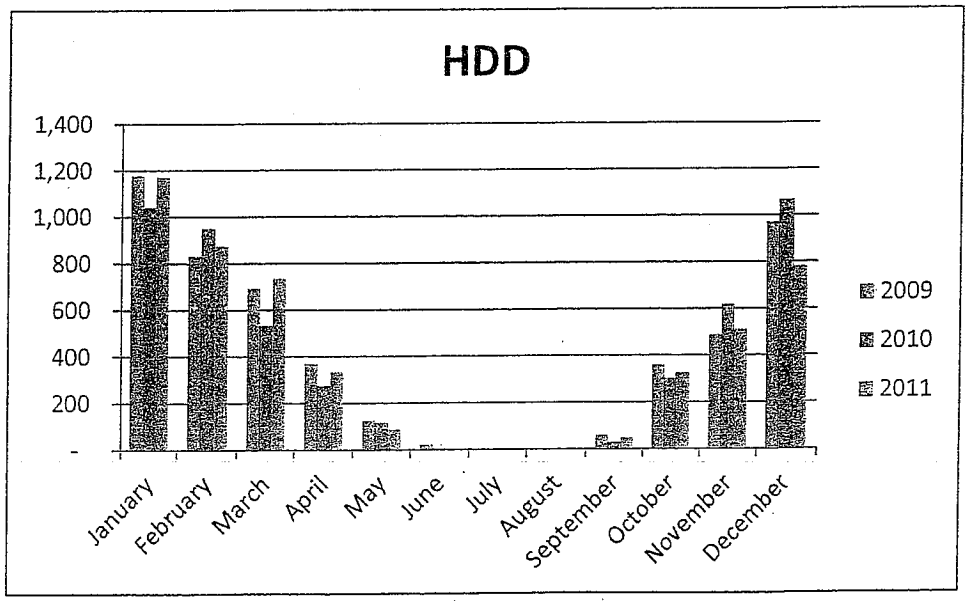


Year 1			Year 2			Year 3		
Month	Heating Degree Days	Cooling Degree Days	Month	Heating Degree Days	Cooling Degree Days	Month	Heating Degree Days	Cooling Degree Days
Jan-09	1,178	-	Jan-10	1,040	-	Jan-11	1,171	-
Feb-09	832	-	Feb-10	950	-	Feb-11	874	-
Mar-09	692	-	Mar-10	533	-	Mar-11	734	-
Apr-09	369	33	Apr-10	275	19	Apr-11	334	26
May-09	125	52	May-10	117	122	May-11	86	105
Jun-09	22	184	Jun-10	5	287	Jun-11	-	236
Jul-09	-	219	Jul-10	-	415	Jul-11	-	446
Aug-09	4	313	Aug-10	-	324	Aug-11	-	274
Sep-09	60	65	Sep-10	29	130	Sep-11	47	141
Oct-09	358	-	Oct-10	302	2	Oct-11	325	-
Nov-09	486	-	Nov-10	617	-	Nov-11	510	-
Dec-09	971	-	Dec-10	1,067	-	Dec-11	780	-
Totals:	5,097	866	Totals:	4,935	1,299	Totals:	4,861	1,228

Data is from www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/ for the station: Harrisburg

Degree Day Explanation:

A degree day is a quantitative index demonstrated to reflect demand for energy to heat or cool houses and businesses. This index is derived from daily temperature observations at nearly 200 major weather stations in the contiguous United States. The "heating year" during which heating degree days are accumulated extends from July 1st to June 30th and the "cooling year" during which cooling degree data are accumulated extends from January 1st to December 31st. A mean daily temperature (average of the daily maximum and minimum temperatures) of 65°F is the base for both heating and cooling degree day computations. Heating degree days are summations of negative differences between the mean daily temperature and the 65°F base; cooling degree days are summations of positive differences from the same base. For example, cooling degree days for a station with daily mean temperatures during a seven-day period of 67,65,70,74,78,65 and 68, are 2,0,5,9,13,0,and 3, for a total for the week of 32 cooling degree days.



SCHEDULE C.A2 – BASE ENERGY RATES

EC Savings from all meters at the Facilities will be calculated by using the Base Energy Rates listed below.

The Base Energy Rates listed below will be increased each year on a cumulative basis as shown in the table in Article II.B of the Agreement.

Electric rates have been escalated by the contract stipulated amount for 1 year to the rates listed below, with the exception of the Judicial Center, which has been determined through utility bill analysis.

Natural gas rates are determined by the incremental cost of a unit of energy, in this case $/CCF

Water and sewer are determined by the incremental cost of the utility.

Electric Rates

1. Prison:	$0.092 / KWH
2. Annex:	$0.100 / KWH
3. Nursing Home:	$0.093 / KWH
4. Judicial Center:	$0.098 / KWH

Natural Gas Rates

1. Prison:	$0.87 / CCF
2. Annex:	$0.82 / CCF
3. Nursing Home:	$0.82 / CCF
4. Judicial Center:	$1.04 / CCF

Combined Water / Sewer Rates

1. Prison:	$4.71 / kGal
2. Annex:	N/A – No anticipated or quantifiable savings
3. Nursing Home:	N/A – No anticipated or quantifiable savings
4. Judicial Center:	N/A – No anticipated or quantifiable savings

SCHEDULE D.A2 – GUARANTEED ENERGY SAVINGS PER CONTRACT YEAR

The Guaranteed Energy Savings per Contract Year is shown in column (2) in Figure D.A2.1. Year One (1) savings are measured and verified. Years Two through Three (2 – 20) are projected based on the Year One (1) measurement. Operational Savings in Column 3 include both Operational Savings and Warranty Savings in Years One (1) through Three (20). See Table D.A2.1 for the annual Operational and Maintenance Savings.

Figure D.A2.1 – 20 Year Cash Flow Analysis

York County Phase III
York, PA
Retrofit
Project Proforma Cash Flows
20 Year Lease Term

Total Phase II Project Cost	6,148,452
Less: Act 129 Rebate Balance	(99,443)
Total Amount Financed	6,049,009
First Year Energy Savings	257,369
First year Operational Savings	371,653
Total First Year Savings	629,022

One Time Escalation	
Electric	0.0%
Annual Escalation Rates	
Electric	4.00%
Oil	4.00%
Propane	4.00%
Gas	4.00%
Coal	4.00%
Water	3.00%
Maintenance	3.00%

1	2	3	4	5	6	7	8	9
Year	Energy Savings	Operational Savings	Total Savings	Avoided Capital Outlays	Lease Payments	Mechanical Service Agreement	Net Savings	Accumulated Savings
const.	127,882		127,882		90,207		37,675	37,675
1	257,369	371,653	629,022	82,002	348,959	332,090	29,975	67,650
2	266,116	382,803	648,919	82,002	360,450	342,053	28,418	96,068
3	275,167	394,287	669,454	82,002	366,191	352,314	32,950	129,018
4	284,532	406,115	690,648	82,002	376,558	362,884	33,209	162,227
5	294,223	418,299	712,522	82,002	386,512	373,770	34,242	196,469
6	304,251	430,848	735,098	82,002	400,979	384,983	31,138	227,607
7	314,627	443,773	758,400	82,002	409,921	396,533	33,949	261,556
8	325,365	457,086	782,451	82,002	423,376	408,429	32,649	294,205
9	336,476	470,799	807,275	82,002	431,343	420,682	37,252	331,457
10	347,975	484,923	832,898	82,002	443,786	433,302	37,812	369,269
11	359,876	499,471	859,346	82,002	454,973	446,301	40,074	409,343
12	372,191	514,455	886,646	82,002	469,798	459,690	39,160	448,503
13	384,937	529,888	914,826	82,002	395,074	473,481	128,273	576,776
14	398,129	545,785	943,914	82,002	405,856	487,685	132,375	709,151
15	411,782	562,159	973,940	82,002	420,607	502,316	133,020	842,171
16	425,913	579,023	1,004,936	82,002	438,965	517,385	130,588	972,759
17	440,539	596,394	1,036,933	82,002	450,836	532,907	135,192	1,107,951
18	455,678	614,286	1,069,963	82,002	466,332	548,894	136,740	1,244,691
19	471,347	632,714	1,104,062	82,002	480,666	565,361	140,037	1,384,728
20	487,567	651,696	1,139,263	82,002	498,776	582,322	140,167	1,524,895
	7,341,942	9,986,455	17,328,398	1,640,043	8,520,163	8,923,383	1,524,895	

Notes by column:

(1) Contract Year as defined in the Agreement.

(2) Projected Energy Use Savings are escalated at the rates listed above

(3) Projected Operational Savings are escalated at 3% per year. See O&M Breakdown Sheet for more detail.

(4) Columns (2) plus (3)

(5) Capital Expenditures avoided by completing proposed Project.

(6)

(7) Ongoing Fees for Measurement & Verification

(8) Annual savings equals columns (4) plus (5) less (6) less (7)

(9) Accumulated savings

Table D.A2.1 – Annual Operational and Maintenance Savings

Detailed Operational and Maintenance Worksheet

Year	Mechanical Lighting Building Detail Operational Savings	Lighting Warranty Savings	Additional Operational Savings	Phase I Sink Controls O&M Savings	Elimination Of Existing Service Agreement	Total Operational Savings
const.						
1	-	0	$0	$20,000	$351,653	371,653
2	-	0	$0	$20,600	$362,203	382,803
3	-	0	$0	$21,218	$373,069	394,287
4	-	0	$0	$21,855	$384,261	406,115
5	-	0	$0	$22,510	$395,789	418,299
6	-		$0	$23,185	$407,662	430,848
7	-		$0	$23,881	$419,892	443,773
8	-		$0	$24,597	$432,489	457,086
9	-		$0	$25,335	$445,463	470,799
10	-		$0	$26,095	$458,827	484,923
11	-		$0	$26,878	$472,592	499,471
12	-		$0	$27,685	$486,770	514,455
13	-		$0	$28,515	$501,373	529,888
14	-		$0	$29,371	$516,414	545,785
15	-		$0	$30,252	$531,907	562,159
16	-		$0	$31,159	$547,864	579,023
17	-		$0	$32,094	$564,300	596,394
18	-		$0	$33,057	$581,229	614,286
19	-		$0	$34,049	$598,666	632,714
20	-		$0	$35,070	$616,626	651,696

SCHEDULE E.A2 – ENERGY CONSERVATION MEASURES

The following section lists the Energy Conservation Measures (ECM's) for the Energy Services Program at "Client". Details may be found in Attachment "A.A2", Scope of Work for Energy Conservation Measures.

ID	TITLE
1.A2	Prison 1979 Mechanical Upgrades
2.A2	Prison 1992 Mechanical Upgrades
3.A2	Prison 1998 Mechanical Upgrades
4.A2	Prison 2005 Mechanical Upgrades
5.A2	Prison Campus Control Upgrades
6.A2	Prison Water Conservation
7.A2	Annex Central Mechanical Plant
8.A2	Nursing Home Mechanical Upgrades
9.A2	Judicial Center Recommissioning
10.A2	Building Envelope

SCHEDULE F.A2 – TOTAL PROJECT FEE

The Total Project Fee for the Energy Conservation Measures listed in Schedule E.A2 is Six Million One Hundred Forty-eight Thousand Four Hundred Fifty-two Dollars ($6,148,452).

SCHEDULE J.A2 – MATERIALS AND MAINTENANCE SAVINGS

The operations and maintenance savings for the Investment Grade Audit were calculated by using data provided by the County of York, historical data, industry standards and averages, actual material costs, actual repair costs and outside purchased repairs and service costs. The savings as listed and explained below are stipulated savings. The County agrees these dollars will be avoided by the implementation of the McClure Company Energy Services Program at the County of York.

DEFERRED MAINTENANCE / AVOIDED CAPITAL

1. Prison, 1979 Addition, Major Mechanical Equipment

The majority of the existing HVAC equipment serving the 1979 addition of the Prison, barring a recent chiller and associated pump replacement, is original to the building, therefore approximately 33 years old. The major equipment is in poor condition and in need of immediate replacement in order for the system to remain reliable.

Aside from annual energy savings associated with replacing the equipment, the County will also benefit by avoiding future costs associated with equipment replacement, therefore considered deferred cost savings or capital avoidance.

Only equipment identified as vital to providing the 1979 Addition's HVAC needs have been included in the deferred maintenance savings.

1. Air Handling Unit Replacement =	$ 569,729 (Includes Direct Digital Controls)
2. Domestic Hot Water Heaters =	$ 94,027
	$ 663,756

The above values reflect a good faith estimate for a direct replacement and include all costs (equipment, labor, material, electrical, engineering, testing, balancing, etc) for a turnkey installation.

2. Prison, 1992 Addition, Centrifugal Chiller Replacement

The 1992 Addition is served by a 285 ton centrifugal chiller that is original to the building. Over the past several years, the unit has been problematic with the most recent being a continuous refrigerant leak. The unit is currently operating with a "patch repair", however, is considered temporary and needs to be addressed in order to sustain the unit's reliability. This is the sole unit providing cooling for this portion of the building.

The unit is nearing the end of its life expectancy; therefore, rather than spending additional money to repair the existing unit, it will be replaced with a new high efficient unit. To further increase system efficiency and reliability, the associated pumps will also be replaced.

Chiller and Pump Replacement = $ 292,749 (Includes Direct Digital Controls)

The above values reflect a good faith estimate for a direct replacement and include all costs (equipment, labor, material, electrical, engineering, testing, balancing, etc) for a turnkey installation.

3. Prison, 2005 Addition, Domestic Water Heater

The 2005 Addition domestic hot water needs are served by two gas fired water heaters as manufactured by Lochinvar. Although the units are less than 10 years old and operational, they have both been problematic since being put into service. The County spends, on average, $10,000 per year to keep the units operational. The problems have been sporadic and not related to one specific component. To avoid investing additional money into the problematic units, they will be replaced with new.

Water Heater Replacement = $89,678

The above values reflect a good faith estimate for a direct replacement and include all costs (equipment, labor, material, electrical, engineering, testing, balancing, etc) for a turnkey installation.

4. Annex Chiller Replacement

The Annex Building's cooling needs are currently served by (2) air cooled chillers, which are approximately 35 years old and in need of immediate replacement. Although operational, the units are in very poor condition, inefficient and no longer considered reliable.

The units will be replaced in kind with new high efficient units. In addition, the associated piping insulation, valves, pumps, accessories and controls will also be replaced.

Air Cooled Chiller & Pump Replacements = $164,000

The above values reflect a good faith estimate for a direct replacement and include all costs (equipment, labor, material, electrical, engineering, testing, balancing, etc) for a turnkey installation.

5. Annex Window and Exterior Door Replacement

The majority of the Annex windows and exterior doors are original to the building and in very poor condition. The facility has two types of windows; wooden sash single pane and aluminum frame single pane. The aluminum units have a thin line aluminum frame with no thermal break. They are in poor operating condition and inefficient. The wooden units are rotting both inside and out and beyond repair.

The majority of the exterior doors are wooden and, like the wooden window units, are rotting and beyond repair. The County has applied wood / epoxy filler for the past several years as a temporary fix, however, the unit are now in complete disrepair.

Exterior Window and Door Replacement = $364,311

The above values reflect a good faith estimate for a direct replacement and include all costs (equipment, labor, material, electrical, engineering, testing, balancing, etc) for a turnkey installation.

6. Nursing Home Rooftop Unit Replacement

Two existing roof top HVAC units serving the Nursing Home Laundry and Dietary facilities are currently in disrepair and in need of immediate replacement. A 15 ton, cooling only unit, that serves the Café, was found to have severely damaged fins on the coils to point of maintenance concern over the operation of the unit.

On the Laundry Building, a 9,800 CFM Reznor make up air unit (MUA) has exterior damage requiring the maintenance staff to cover the unit with a tarp to prevent leaking from precipitation. The unit provides only outdoor air and does not condition (heat or cool).

Rooftop Unit Replacement = $65,549

The above values reflect a good faith estimate for a direct replacement and include all costs (equipment, labor, material, electrical, engineering, testing, balancing, etc) for a turnkey installation.

OPERATIONAL

Phase 1 Operational Savings

The Prison scope of work through Phase I was modified to replace hand sink controls in lieu of the originally proposed shower controls. The Prison, on average, was spending approximately $30,000 per year due to

failing components in the existing hand sink controllers. Each unit was replaced with new semi-maintenance free units as manufactured by I-CON Systems. The units are battery operated, which does require periodic replacement depending on the amount of use. For this reason, and to remain conservative, we have attributed $20,000 as annual operational savings as opposed to the full $30,000.

Due to the Phase I scope being modified after the original agreement was executed; the above operational savings were not part of the Original Agreement Operational savings. Therefore the associated annual savings of $20,000 are being carried forward as part of this Amendment No.2.

SCHEDULE L.A2 – MEASUREMENT AND VERIFICATION PLAN

ID	TITLE
1.A2	Prison 1979 Mechanical Upgrades
2.A2	Prison 1992 Mechanical Upgrades
3.A2	Prison 1998 Mechanical Upgrades
4.A2	Prison 2005 Mechanical Upgrades
5.A2	Prison Campus Control Upgrades
6.A2	Prison Water Conservation
7.A2	Annex Central Mechanical Plant
8.A2	Nursing Home Mechanical Upgrades
9.A2	Judicial Center Recommissioning
10.A2	Building Envelope

M&V Plan: M&V General Overview

Introduction

This section provides procedures and guidelines for quantifying savings resulting from the installation of ECMs under energy performance contracts and is intended to comply with the International Performance Measurement & Verification Protocol (IPMVP). The IPMVP was developed to provide a commonly accepted methodology for measuring energy savings associated with performance contracts. There are two components of M&V for Energy Saving Performance Contracting (ESPC) projects:

- **Verifying ECM potential to perform and generate savings -** by confirming that: 1) baseline conditions are accurately defined, and 2) the appropriate equipment components or systems are properly installed, performing per specification and have the potential to generate predicted savings.
- **Verifying ECM performance (savings)** - by determining the actual energy savings achieved by the installed ECM.

The general approach to determining energy savings involves comparing the energy use associated with a facility, or certain systems within a facility, before installation of the ECM (baseline) and after installation of the ECM (post-installation). Therefore, in general:

Energy savings = (baseline energy use) - (post-installation energy use)

As ESPC projects are based on pay for performance, each ECM or site will have a site-specific verification process to determine its savings. For each site or project, the baseline and post-installation energy use will be defined using metering, billing analysis and/or engineering calculations (possibly including computer simulation). In addition, values for certain factors that affect energy use and savings, and that are beyond the control of McClure Company (i.e., building occupancy), may be stipulated by the customer sponsoring the project.

With the completion of the project, McClure Company will submit a report that defines projected energy savings based on the before and after measurements. This report must be accepted and approved by the customer.

Verifying ECM Potential to Perform

Maintaining Service Quality

The Demand Side Management (DSM) measures installed under ESPC programs should maintain or improve the quality of service provided to the customer by the affected equipment or systems. For example, lighting projects that reduce lighting levels must maintain some minimum standards, i.e., the minimum standard for the facility's primary use.

Baseline Verification

Baseline conditions may be defined by either the customer or McClure Company. If the baseline is customer-defined, then McClure Company will have the opportunity to verify it. If the baseline is defined by McClure Company, the customer will verify it. Baseline physical conditions such as equipment counts, nameplate data, and energy consumption rate and control strategies will typically be determined through surveys, inspections and/or spot or short-term metering activities. Variables which affect baseline energy calculations such as weather and building occupancy are identified.

Post-Installation Verification
In a post-installation M&V verification, McClure Company and customer agree that the proper equipment components or systems were installed, are operating correctly and have the potential to generate the predicted savings. Verification methods may include surveys, inspections and/or continuous metering. McClure Company is expected to complete the system/equipment commissioning.

Verifying ECM Performance

After the ECM is installed, McClure Company and customer will determine energy savings in accordance with an agreed-upon M&V method using verification techniques defined in this M&V plan.

Verification Techniques
Baseline energy use, post-installation energy use and energy (and cost) savings will be determined using the following M&V techniques:

- Engineering Calculations
- Metering And Monitoring
- Utility Meter Billing Analysis
- Computer Simulations, e.g. TRANE Trace Building Simulation
- Agreed-Upon Stipulations By The Customer And McClure Company

Estimating Energy Savings
There are numerous factors that can affect energy savings during the term of a contract such as weather, operating hours, process loads and heat exchanger fouling. In general, one ESPC contract objective may be to adjust baseline energy use up or down for factors beyond the control of McClure Company (e.g., changes in building occupancy or weather), and adjust post-installation energy use for controllable factors (e.g., maintenance of equipment efficiency).
In order to calculate energy savings, the customer may in some cases stipulate the value of factors that are difficult to determine or that may vary during the contract term. The lighting hours of operation are an example of a stipulated factor. In other situations, continuous or regular interval measurements throughout the term of the contract may be compared to baseline energy measurements to determine savings.

There are four industry-accepted options to verifying energy savings. **Option A** emphasizes verification of performance factors and involves determining long-term savings through use of stipulations for operational factors. **Option B and C** involves use of long term metering data; **Option B** involves end use data analysis and **Option C** involves whole building data analysis. **Option D** involves calibrated building simulation.

Option A focuses on physical assessment of equipment changes to insure the installation is to specification. Key performance factors (lighting wattage or chiller efficiency) are determined with spot or short-term measurements and operational factors (lighting hours of operation or cooling ton-hours) are stipulated based on analysis of historical data or spot/short term measurements. The savings are determined using spot or short-term measurements. An example of the measurements will be measuring the wattage use of fixed number of samples of lighting fixtures both before and after the lighting retro-fit.

Option B savings are determined after the project completion by short term or continuous measurements taken up to one year following the completion of the installation. The baseline for option B is determined through energy measurements during the IGA phase. The actual baseline is projected to an annual cost through use of standard engineering calculations. The savings are determined by comparison of the baseline to the measured results.

Option C is also referred to as the "whole house" method to determine savings. Whole campus comparison determines the collective savings of all appropriate ECM's. The baseline energy is adjusted to account for factors such as weather. The savings are determined by analysis of utility meter (or sub-meter) data using techniques from simple comparison to regression analysis.

Option D savings are determined through simulation of facility components and/or the whole facility. The savings are determined by energy simulation/modeling calibrated with monthly utility billing data and or end-use metering

M&V Methodology

The following sample table shows an ECM and the proposed method to determine savings. Once the final list of all ECM's is developed this table will be completed for all ECM's.

ID Number	ECM Title	M&V Methodology
1.A2	Prison 1979 Mechanical Upgrades	IPMVP Option C
2.A2	Prison 1992 Mechanical Upgrades	IPMVP Option C
3.A2	Prison 1998 Mechanical Upgrades	IPMVP Option C
4.A2	Prison 2005 Mechanical Upgrades	IPMVP Option C
5.A2	Prison Campus Control Upgrades	IPMVP Option C
6.A2	Prison Water Conservation	IPMVP Option C
7.A2	Annex Central Mechanical Plant	IPMVP Option B
8.A2	Nursing Home Mechanical Upgrades	IPMVP Option A
9.A2	Judicial Center Recommissioning	IPMVP Option C
10.A2	Building Envelope	IPMVP Option D

Methods to Measure Pre-Installation and Post Installation Energy Use

For the electrical savings measurement, McClure Company will establish a baseline and verify savings with pre and post installation measurements. This applies to savings that are determined with option A or option B. There are times when a measurement of either pre or post installation variables is not possible. In those cases, McClure Company will model the building to determine the baseline and the post installation energy use. This is option D, which has only been applied to one ECM.

Savings determined with Option D are based on one or more complex estimates of energy use. Therefore, the accuracy of the savings is completely dependent on how well the simulation models actual performance and how well calibrated it is to actual performance.

Calibration is achieved by verifying that the simulation model reasonably predicts the energy use of the facility by comparing model results to a set of calibration data. This calibration data should be at minimum, measured energy consumption and demand data, for the portion of the facility being simulated. Calibration of building simulations is usually done with 12 monthly utility bills. The calibration data set should be documented along with a description of its source(s).

Other operating data from the facility can be used as simulation input data as part of the calibration data set. These data might include operating characteristics and profiles of key variables such as use and occupancy, weather, known loads, equipment operating periods and efficiency.

Verifying Savings

For this agreement, the Trace 700 Energy simulation software will be used. This program is based on the cooling energy calculated with the TETD-TA1method and the heating energy is analyzed using the UATD method, both are approved by ASHRAE.

Following collection of as much calibration data as possible, the steps in calibrating the simulation are as shown below.

1. Assume other input parameters and document them.
2. Verify that the simulation predicts reasonable operating results such as space or process temperature/ humidity.
3. Compare simulated energy and demand results with metered data, on an hourly or monthly basis. Use actual weather data when conditions vary significantly from average year weather data. Assess patterns in the differences between simulation and calibration data, Bar charts, monthly percent difference time-series graphs and monthly x-y scatter plots give visual presentations which aid the identification of error patterns.

Revise assumed input data in step I and repeat steps 2 and 3 to bring predicted results reasonably close to actual energy use and demand. More actual operating data from the facility may also be needed to improve the calibration.

Each ECM has its own specific variables to be measured to determine the energy use. There are also common variables to be determined those would include hours of operation, electrical use, change in operating conditions, change in efficiency, variable air flow.

The following list will include metering devices and their expected use.

H08-004-02	Light level measurement
H08-002-02	Record Electrical Use
TMC6-HD	Temperature Measurement
Onset CTV-C	Electrical Measurement
Q-Track Plus	Carbon Dioxide Determination
Fluke 189	True RMS Electric Meter
Fluke i1010	Electrical Amperage (current clamp)
Bacharach 450ECA	Combustion Analyzer
WattStopper IT200	Occupancy and light logger

Adjustment to Baseline Methodology

But, in reality, the conditions can and do change. And, a variation in any one of these factors can result in a present day energy consumption rate that is different from the baseline rate. In order to develop a true picture of energy savings and a fair assessment of the guarantee in light of an operating change, the baseline energy consumption must be adjusted to current conditions. The adjustment could be a one-time alteration resulting from an unusual situation that occurred in the building for a short time, a permanent adjustment caused by a permanent change in the facility use, or an annual adjustment caused by a continually changing parameter such as the weather.

The adjustment of a single, short time occurrence is usually done by manually calculating the additional energy use caused by the occurrence and subtracting it from the energy use recorded for that period. An example of this would be a fan control that malfunctioned and kept the fan running during unoccupied hours when it should

have been shut off. The adjustment would be made by calculating the kilowatt hours used by the fan and subtracting that figure from the utility bill for that time period so a fair comparison can be made with the baseline.

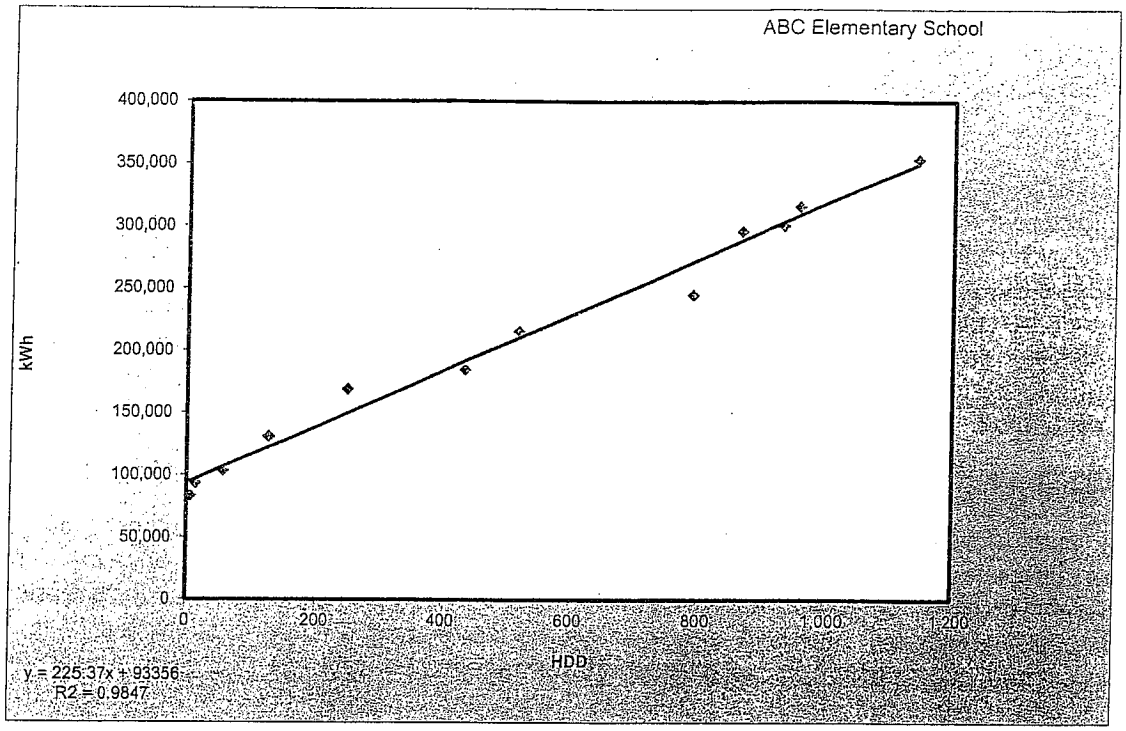
A permanent adjustment can be done in a similar fashion or, for more complex situations; a computer simulation might be the best approach. But, unlike the previously described method, the additional energy use here would be added to the baseline consumption to form a new profile. A simple example of a permanent change would be the installation of new equipment such as computers. The electricity used by these devices can be manually calculated and the result would be added to the established baseline. Changes in operating hours or a physical alteration to the building can have an interactive impact on most, if not all, of the various energy consuming systems in a facility. The ability to account for the new consumption trends usually requires a computer simulation.

Weather Normalization

Of the three types of adjustments, the one most commonly seen is an annual adjustment needed to account for significant differences in weather conditions between the current year and the baseline. This process is sometimes referred to as "weather normalization". The concept requires that a mathematical relationship between the baseline energy use and degree-days be developed. Once established, this relationship is applied to the current degree-days to calculate what the baseline energy use would have been under the same weather conditions. The result of the calculation is then compared to the recorded post retrofit energy use to determine savings.

For metered energy consumption, such as for electricity or natural gas, a statistical method called "regression analysis" is used to establish the mathematical relationship. In this analysis, a graph of the baseline energy use vs. the corresponding degree-days is created on a computer spreadsheet and the program develops the equation of the line or curve that "best fits" the data points. The current values for the corresponding post retrofit degree-days are substituted into the equation to calculate the adjusted baseline energy use.

Below is a sample of a graph used in regression analysis. Note that, in the equation, the y term is the energy use term and the x term is the degree day term. Also note the R^2 term. This is known as the "correlation coefficient". It is simply an indication of how accurately the curve fits the data points; the closer R^2 is to "1", the better the fit. The resulting equation of the curve is considered accurate for R^2 values of 0.9 or greater.



The way the adjustments are made is best depicted by example: The previous graph was developed from degree day records and utility bills in which the baseline electricity use for 957 heating degree days in December was 315,886 kWh. Suppose that for the year following the retrofit, the heating degree-days for the same period increased to 1,289. By substituting this new value into the defining equation shown in the lower left corner of the graph, it is determined that the December baseline electric use should be increased to 383,858 kWh to adjust for the higher degree days. In other words: *the baseline figure must be adjusted to reflect* ***what the energy use would have been*** *at the current conditions if the energy services retrofit had not taken place.*

This adjusted figure is then compared to the actual use to determine savings.

For fuel oil and other non-metered fuel, a ratio of degree-days can be used to adjust the base year:

FCa = (FCb)(DDc/DDb)

Where: FCa = Adjusted fuel consumption
FCb = Baseline fuel consumption
DDc = Current degree days
DDb = Baseline degree days

The remainder of this section will describe the measurement and verification methods that will be used for the various ECM's on this project.

M&V Plan
Utility Bill Comparison
Based on IPMVP Option: C
Applies to ECM: 1.A2, 2.A2, 3.A2, 4.A2, 5.A2, & 6.A2

ECM Definition
The measures covered by this verification plan are the electric, natural gas, and water/sewer savings associated with all the mechanical energy conservation measures (ECMs) that directly impact the Prison. The mechanical system consists of air handlers served from hot water boilers and air cooled chillers. The mechanical system will undergo significant alteration, especially in the1979 and 1992 sections with replacement of central plant equipment and air handler replacement in the 1979 section.

Verification Method
Option C involves the comparison of historical energy use to post installation energy use. The actual utility bills will provide the basis of comparison.

Baseline Demand
The baseline energy use for this ECM will be the electric, natural gas, and water/sewer use from January 2011 through December 2011.

Adjustments to Baseline Demand
The baseline demand will be adjusted to account for changes in the weather. The baseline energy use will be adjusted to account for changes in the weather between the baseline year and current year of measurement and verification.

As part of the overall energy savings, McClure is proposing reducing operating hours of certain pieces of mechanical equipment. Part of the energy savings associated with the new controls automation will be to reduce the hours of operation of the mechanical equipment. Once McClure proves the reduced operating hours can be achieved without effecting comfort any increase in operating hours could result in an adjustment, to the current month's energy bill. McClure will prove the hours of operation can be reduced during the commissioning phase.

The amount of outside ventilation air entering the mechanical equipment for ventilation may be less than that required by code. Since outside air can have a significant impact on energy use, especially if current operation of the mechanical equipment does not meet outside air code requirements, an adjustment to the energy baseline will be made to account for the additional outside air required to meet code requirements.

Determining Energy Savings
The savings are determined by comparing the post installation utility usage to the baseline energy use on a monthly basis. Along with a comparison of baseline energy use to post installation energy use, the post installation energy use will be compared to the expected savings on a monthly basis. The table below represents the format that will be used to determine energy savings.

Projected savings are not used in the guarantee determination but do provide a reference to utility performance compared to expected reduction.

Prison KWH

Month	ADJ Baseline	Projected Use	Year One	Contract Baseline	Outside Air Adjustment	Lighting Savings	Projected Savings	Weather ADJ	Measured Savings (KWH)	Measured Savings ($)
January	-	-		565,531	0	0	41,330	1.00	-	-
February	-	-		554,870	0	0	37,007	1.00	-	-
March	-	-		593,925	0	0	34,970	1.00	-	-
April	-	-		553,193	0	0	24,287	1.00	-	-
May	-	-		678,142	0	0	24,287	1.00	-	-
June	-	-		924,507	0	0	61,835	1.00	-	-
July	-	-		934,921	0	0	95,246	1.00	-	-
August	-	-		959,866	0	0	67,881	1.00	-	-
September	-	-		922,384	0	0	46,720	1.00	-	-
October	-	-		793,986	0	0	29,017	1.00	-	-
November	-	-		599,411	0	0	31,710	1.00	-	-
December	-	-		554,632	0	0	35,639	1.00	-	-
TOTALS	0	0		8,630,916	0	0	539,910		0	0

Baseline January 2011 to December 2011

Year 1 Savings starts with after commissioning complete

Percentage ADJ Baseline effected by HDD	85%
Percentage ADJ Baseline effected by CDD	65%

CDD effects month June, July, August, and September only

Contract Cost per KWH	$0.09
Annual Increase in Energy Costs per Contract	4.00%

HDD effects months January, Feburary, March, October, November, December

Prison CCF

Month	ADJ Baseline	Projected Use	Year One	Contract Baseline	Outside Air Adjustment	Projected Savings	Weather ADJ	Measured Savings (CCF)	Measured Savings ($)
January	-	-		40,910	0	8,097	1.00	-	-
February	-	-		40,941	0	6,610	1.00	-	-
March	-	-		40,969	0	5,909	1.00	-	-
April	-	-		41,000	0	2,235	1.00	-	-
May	-	-		41,030	0	2,235	1.00	-	-
June	-	-		41,061	0	2,235	1.00	-	-
July	-	-		41,091	0	2,235	1.00	-	-
August	-	-		41,122	0	2,235	1.00	-	-
September	-	-		41,153	0	2,235	1.00	-	-
October	-	-		41,183	0	3,862	1.00	-	-
November	-	-		41,214	0	4,788	1.00	-	-
December	-	-		41,244	0	6,140	1.00	-	-
TOTAL	0	0		492,918	0	54,946		0	0

Baseline January 2011 to December 2011

Year 1 Savings starts with after commissioning complete

Percentage ADJ Baseline effected by HDD	85%
Percentage ADJ Baseline effected by CDD	65%

CDD effects month June, July, August, and September only

Contract Cost per CCF	$0.87
Annual Increase in Energy Costs per Contract	3.00%

Prison Water/Sewer

Month	ADJ Baseline	Projected Use	Year One	Contract Baseline	Projected Savings	Weather ADJ	Measured Savings (kGal)	Measured Savings ($)
January	-	-		6,561	8,097	1.00	-	-
February	-	-		7,063	6,610	1.00	-	-
March	-	-		6,492	5,909	1.00	-	-
April	-	-		6,951	2,235	1.00	-	-
May	-	-		5,779	2,235	1.00	-	-
June	-	-		5,610	2,235	1.00	-	-
July	-	-		6,490	2,235	1.00	-	-
August	-	-		3,712	2,235	1.00	-	-
September	-	-		4,639	2,235	1.00	-	-
October	-	-		5,548	3,862	1.00	-	-
November	-	-		6,778	4,788	1.00	-	-
December	-	-		5,973	6,140	1.00	-	-
TOTAL	0	0	0	71,597	48,819		0	0

Baseline January 2011 to December 2011

Year 1 Savings starts with after commissioning complete

Percentage ADJ Baseline effected by HDD	0%	Contract Cost per kGal	$4.71
Percentage ADJ Baseline effected by CDD	0%	Annual Increase in Energy Costs per Contract	3.00%

CDD effects month June, July, August, and September only

Savings Calculation:

HDD Impact = *Percentage Adjusted Baseline Impacted by Heating Degree Days (HDD)*

Weather ADJ = *Current Month HDD/ Current Month Baseline HDD*

ADJ Baseline = *((Contract Baseline + Outside Air Adjustment) * Weather Adj * HDD impact) + ((1 – HDD Impact)*Contract Baseline)*

Projected Use = *Adj Baseline – (Projected savings + Lighting Savings)*

Electric Savings Determination

Measured Savings = *(Adj. Baseline – Lighting Savings) – Year One*

M&V Plan

Short-Term Metering

Based on IPMVP Option: B
Applies to ECM: 7.A2

ECM Definition

The measures covered by this verification plan are energy saving associated with replacing or adding equipment to reduce electrical use. The electrical energy savings/usage associated with the chiller replacements and central plant additions result from replacing an older less efficient chiller with a newer more efficient chiller and installing a new central plant for the Annex.

Verification Method Overview

Surveys will be made of all baseline (existing) equipment. Corrections may be required for non-operating equipment. Equipment energy use will be determined from short-term measurements of representative sample of equipment. The equipment to be replaced will also be metered after installation to determine the reduction in electrical use. For new gas use by the boilers a utility analysis of use will be used given the baseline is currently 0.

Baseline Demand

The baseline conditions identified in the pre-installation survey will be defined by McClure Company in the IGA and verified by the Client. In the pre-installation survey, the equipment to be changed is inventoried and a representative sample will be metered on a short-term basis.

Determining Energy Savings

The annual baseline energy is measured and calculated following installation the energy use is again metered and the reduction in electrical use is documented.

Equations for Calculation of Energy and Demand Savings

$KWH_{baseline} = (Volts * Amps * 1.732 * PF)/1{,}000 * sample\ period\ Interval\ (hr)$
$KWH_{post} = (Volts * Amps * 1.732 * PF)/1{,}000 * sample\ period\ Interval\ (hr)$
$KWH_{savings} = KWH_{baseline} - KWH_{post}$

Baseline
Volts = Measured both pre and post installation
Amps = Measured by a programmable data logger.
PF = Power factor. This will be measured by a hand help power factor meter.

Post
Chiller and Pump Electrical Use will be recorded and trended by the building automation system.
PF = Power factor. This will be measured by a hand help power factor meter.

M&V Plan
Spot Metering with Stipulated Operating Hours
Based on IPMVP Option: A
Applies to ECMs: 8.A2

ECM Definition

The measures covered by this verification plan are insulation replacement on steam lines with new insulation or insulation jackets. The insulation will contain the heat from the steam and reduce the convector like effect of uninsulated piping in the steam central plant and distribution corridors, as well as in the mechanical rooms that contain the heat exchangers. The hours of operation for the steam will be stipulated as well as the heat loss for the given pipe size and boiler efficiency of the central plant.

Verification Method

Surveys will be made of all baseline (existing) and post-installation (new) areas. Corrections may be required for non-operating fixtures, such as valves. The operating hours are stipulated in the contract at 8,760 hours per year and must be agreed upon by the Client and McClure Company.

Baseline Demand

The baseline conditions identified in the pre-installation survey will be defined by McClure Company in the IGA and verified by the Client. In the pre-installation survey, the areas receiving new insulation will be inventoried. The surveys will include, in a set format, area, type of insulation required, length or item requiring insulation, and pipe size;.

Adjustments to Baseline Demand

Prior to installation of new insulation, adjustments to the baseline demand may be required for additional areas of insulation.

Equations for Calculation of Energy and Demand Savings

The annual baseline energy usage is the sum of the baseline heat loss for all of the affected areas. The post-retrofit energy usage is calculated similarly. The energy savings are calculated as the difference between baseline and post-installation energy usage. The stipulated operating hours will be used for both the baseline and post-installation energy calculations.

$BTU\ Savings_t = (length_{pipe}\ or\ quantity_{fixture} \times Q_a \times hours\ of\ operation) \div Boiler\ Efficiency$

Hours of Operation = The stipulated operating hours will be used for both the baseline and post-installation energy calculations.

Where:

$BTU\ Savings_t$ =	BTU savings realized during the post-installation time period *t*
$length_{pipe}$ =	Length of un-insulated pipe found during initial survey
$quantity_{fixture}$ =	Quantity of fixture requiring insulation jacket such as a valve or strainer
Q_a =	Heat loss of the specific pipe size or fixture in question
Hours of Operation =	total number of post-installation operating hours (assumes number is the same before and after the lighting retrofit) for usage group
Boiler Efficiency =	Assumed efficiency of central plant mechanical system providing steam to the components of the usage group.

M&V Plan

Utility Bill Comparison

Based on IPMVP Option: C
Applies to ECM: 9.A2

ECM Definition

The measures covered by this verification plan are the electric and natural gas savings associated with all the mechanical energy conservation measures (ECMs) that directly impact the Judicial Center. The mechanical system consists of air handlers served from hot water boilers and water cooled chillers. The mechanical system will be re-commissioned to operate as design intended with additions to programming and controls to develop energy savings outside of occupied operation.

Verification Method

Option C involves the comparison of historical energy use to post installation energy use. The actual utility bills will provide the basis of comparison.

Baseline Demand

The baseline energy use for this ECM will be the electric and natural gas use from January 2011 through December 2011.

Adjustments to Baseline Demand

The baseline demand will be adjusted to account for changes in the weather. The baseline energy use will be adjusted to account for changes in the weather between the baseline year and current year of measurement and verification.

As part of the overall energy savings, McClure is proposing reducing operating hours of certain pieces of mechanical equipment. Part of the energy savings associated with the new controls automation will be to reduce the hours of operation of the mechanical equipment. Once McClure proves the reduced operating hours can be achieved without effecting comfort any increase in operating hours could result in an adjustment, to the current month's energy bill. McClure will prove the hours of operation can be reduced during the commissioning phase.

The amount of outside ventilation air entering the mechanical equipment for ventilation may be less than that required by code. Since outside air can have a significant impact on energy use, especially if current operation of the mechanical equipment does not meet outside air code requirements, an adjustment to the energy baseline will be made to account for the additional outside air required to meet code requirements.

Determining Energy Savings

The savings are determined by comparing the post installation utility usage to the baseline energy use on a monthly basis. Along with a comparison of baseline energy use to post installation energy use, the post installation energy use will be compared to the expected savings on a monthly basis. The table below represents the format that will be used to determine energy savings.

Projected savings are not used in the guarantee determination but do provide a reference to utility performance compared to expected reduction.

Judicial KWH

Month	ADJ Baseline	Projected Use	Year One	Contract Baseline	Outside Air Adjustment	Lighting Savings	Projected Savings	Weather ADJ	Measured Savings (KWH)	Measured Savings ($)
January	-	-		436,533	0	0	25,238	1.00	-	-
February	-	-		441,960	0	0	25,238	1.00	-	-
March	-	-		465,763	0	0	25,238	1.00	-	-
April	-	-		470,719	0	0	25,238	1.00	-	-
May	-	-		493,881	0	0	25,238	1.00	-	-
June	-	-		628,743	0	0	84,132	1.00	-	-
July	-	-		618,667	0	0	136,538	1.00	-	-
August	-	-		665,730	0	0	93,615	1.00	-	-
September	-	-		661,714	0	0	60,425	1.00	-	-
October	-	-		545,520	0	0	25,238	1.00	-	-
November	-	-		500,104	0	0	25,238	1.00	-	-
December	-	-		512,043	0	0	25,238	1.00	-	-
TOTAL	0	0	0	6,411,567	0	0	575,618		0	$0

Baseline January 2011 to December 2011

Year 1 Savings starts with after commissioning complete

Percentage ADJ Baseline effected by HDD	85%	Contract Cost per KWH	$0.09
Percentage ADJ Baseline effected by CDD	65%	Annual Increase in Energy Costs per Contract	4.00%
CDD effects month June, July, August, and September only		HDD effects months January, Feburary, March, October, November, December	

Judicial Therms

Month	ADJ Baseline	Projected Use	Year One	Contract Baseline	Outside Air Adjustment	Projected Savings	Weather ADJ	Measured Savings (Therms)	Measured Savings ($)
January	-	-		26,050	0	3,746	1.00	-	-
February	-	-		34,770	0	2,796	1.00	-	-
March	-	-		17,670	0	2,348	1.00	-	-
April	-	-		18,070	0	0	1.00	-	-
May	-	-		8,770	0	0	1.00	-	-
June	-	-		7,230	0	0	1.00	-	-
July	-	-		8,610	0	0	1.00	-	-
August	-	-		6,380	0	0	1.00	-	-
September	-	-		7,110	0	0	1.00	-	-
October	-	-		9,550	0	1,040	1.00	-	-
November	-	-		9,760	0	1,632	1.00	-	-
December	-	-		14,730	0	2,496	1.00	-	-
TOTAL	0	0	0	168,700	0	16,058		0	$0

Baseline January 2011 to December 2011

Year 1 Savings starts with after commissioning complete

Percentage ADJ Baseline effected by HDD	85%	Contract Cost per CCF	$0.87
Percentage ADJ Baseline effected by CDD	65%	Annual Increase in Energy Costs per Contract	3.00%
CDD effects month June, July, August, and September only			

Savings Calculation:

HDD Impact = *Percentage Adjusted Baseline Impacted by Heating Degree Days (HDD)*

Weather ADJ = *Current Month HDD/ Current Month Baseline HDD*

ADJ Baseline = *((Contract Baseline + Outside Air Adjustment) * Weather Adj * HDD impact) + ((1 – HDD Impact)*Contract Baseline)*

Projected Use = *Adj Baseline – (Projected savings + Lighting Savings)*

Electric Savings Determination

Measured Savings = *(Adj. Baseline – Lighting Savings) – Year One*

M&V Plan

Calculated/Modeled Savings

Based on IPMVP Option: D
Applies to ECM: 10.A2

ECM Definition

The measures covered by this verification plan are the energy savings related to the building envelope upgrades at the Nursing Home and Annex. Additional clarification of scope of work can be found in the technical solutions segment of the IGA. For this M&V method, the savings associated with the ECMs are stipulated. The energy savings are accepted by the customer as achieved once the installation has been completed.

Verification Method Overview

Option D involves the use of computer simulation software to predict facility energy use for one or both of the energy use terms in Equation 1. Such *simulation model* must be "calibrated" so that it predicts an energy use and demand pattern that reasonably matches actual utility consumption and demand data from either the base year or a post-retrofit year.

Baseline Demand

Savings determined with Option D are based on one or more complex estimates of energy use. Therefore, the accuracy of the savings is completely dependent on how well the simulation, models actual performance and how well calibrated it is to actual performance.

Calibration is achieved by verifying that the simulation model reasonably predicts the energy use of the facility by comparing model results to a set of calibration data. This calibration data should at a minimum be measured energy consumption and demand data, for the portion of the facility being simulated. Calibration of building simulations is usually done with 12 monthly utility bills. The calibration data set should be documented along with a description of its source(s).

Other operating data from the facility can be used as simulation input data as part of the calibration data set. This data might include operating characteristics and profiles of key variables such as use and occupancy, weather, known loads, equipment operating periods and efficiency.

Determining Energy Savings

For this agreement, the Trace 700 Energy simulation software will be used. This program is based on the cooling energy calculated with the TETD-TA1method and the heating energy is analyzed using the UATD method, both are approved by ASHRAE.

Following collection of as much calibration data as possible, the steps in calibrating the simulation are as shown below.

1. Assume other input parameters and document them.

2. Verify that the simulation predicts reasonable operating results such as space or process temperature/ humidity.

3. Compare simulated energy and demand results with metered data, on an hourly or monthly basis. Use actual weather data when conditions vary significantly from average year weather data. Assess patterns in the differences between simulation and calibration data, Bar charts, monthly percent difference time-series graphs and monthly x-y scatter plots give visual presentations which aid the identification of error patterns.

4. Revise assumed input data in step I and repeat steps 2 and 3 to bring predicted results reasonably close to actual energy use and demand. More actual operating data from the facility may also be needed to improve the calibration.

5. As part of the verification process, the post installation electric bills will be compared to the baseline electric bills, to assure the results predicted by the computer simulation are being achieved. Any bill comparison will require adjustments to account for changes in weather. The adjustment procedure was described above.

SCHEDULE M.A2 – ACT 129 UTILITY REBATE FUNDING

Through implementation of the various Energy Conservation Measures within the Original Agreement, the County became eligible for Act 129 rebates with their Electrical Distribution Company; First Energy.

McClure Company, on behalf of the County, submitted all pertinent rebate applications pertaining to the Phase 1 upgrades. The County opted to have the rebate funds forwarded to the installing contractor (McClure Company) and to utilize the funds to implement additional Energy Conservation Measures. The total amount of Act 129 rebates funds received, as of the date of this Amendment No.2 is $367,588.16.

The Amendment No.1 of the Original Agreement contract amount was $290,815. Of this amount, $268,145.31 was funded from the Act 129 Rebate amount. Therefore, the remaining balance as of the date of this Amendment No.2 is $99,442.85.

The County of York desires to utilize the remaining Act 129 rebate balance of $99,442.85 to partially fund the total project cost of this Amendment No.2.

Attachment A.A2

ECM 1.A2 – Prison 1979 Mechanical Upgrades

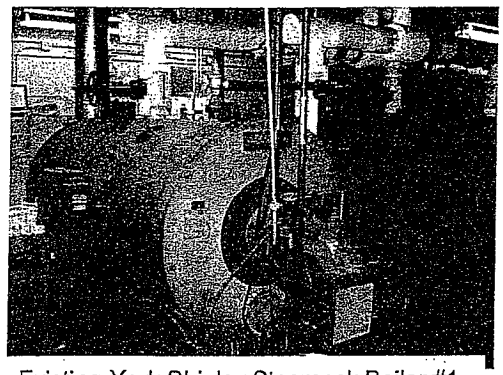
Areas Implemented

- ✓ Prison- 1979 Section

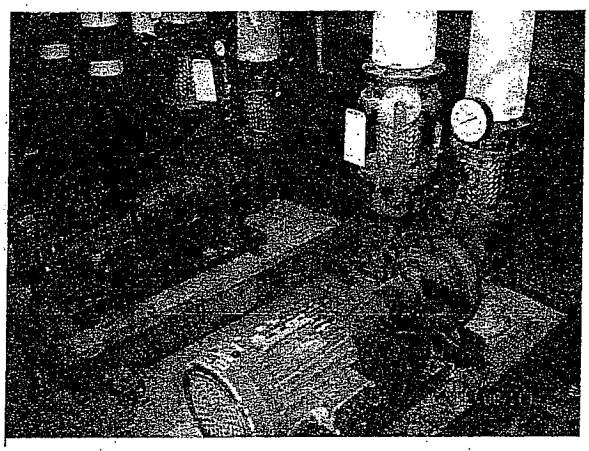
Proposed Solution

Mechanical Room Upgrades

The existing heating central plant for the 1979 section of the Prison is served by (2) 60 BHP York Shipley Steampak, dual fuel (oil and natural gas), hot water boilers with (2) constant volume 7.5 HP building loop pumps that serve various pieces of terminal equipment ranging from radiation to (7) air handling units. The primary fuel for the central plant is natural gas, however, an underground oil tank and ancillary equipment is in place should the facility require back up during an interruption in natural gas service. All equipment is operable, however, is approximately 34 years old and nearing the end of its useful life.



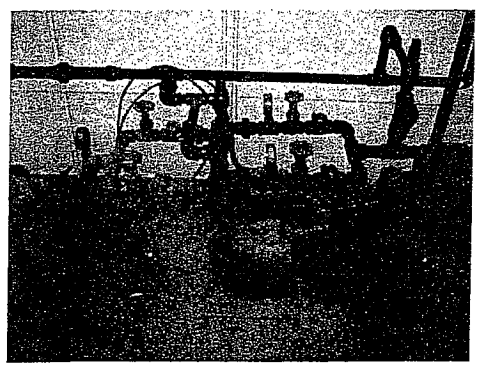
Existing York Shipley Steampak Boiler #1



Existing 7.5 HP hot water loop pumps

McClure Company is proposing to remove both York Shipley boilers and install (1) new Patterson-Kelly MACH C2500 condensing style gas boiler and (1) dual fuel, 60 BHP Weil McClain cast iron sectional boiler to provide the necessary redundancy and dual fuel capabilities required by the facility. The condensing boiler will be designed to generate 150°F hot water. The cast iron sectional boiler will be capable of producing up to 180°F water, if needed, based on the building reset schedule. A ¾ HP inline pump will be installed in the branch piping of the cast iron sectional boiler to continuously circulate higher temperature boiler water. Also, the (2) existing 7.5 HP, heating hot water system pumps will be replaced in kind with pumps with high efficiency motors and variable frequency drives (VFDs).

Additionally, McClure Company is proposing to replace the existing duplex fuel oil pump package. The existing ¼ HP duplex pumps will be replaced in kind. The existing, underground, 10,000 gallon fuel oil storage tank will be drained, filled with sand, and abandoned in place. A new 1,000 gallon, above grade fuel oil storage tank will be installed outside the mechanical room on a new concrete pad to provide the necessary fuel required for the dual fuel redundancy.



Existing fuel oil transfer pumps

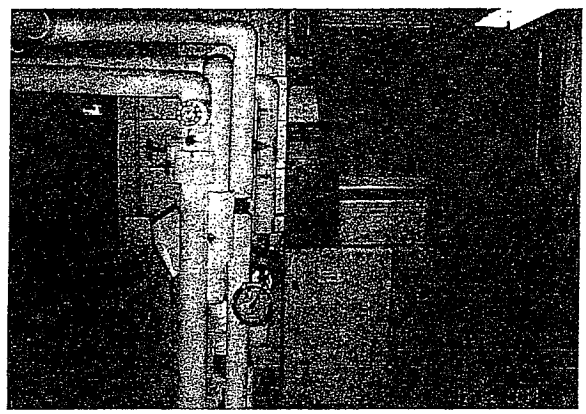
The general scope of work will include:

- ✓ Removal of (2) York-Shipley dual fuel Boilers
- ✓ Installation of (1) new PK MACH gas fired condensing boiler (or approved equal).
- ✓ Installation of (1) new Weil McClain dual fuel cast iron sectional boiler (or approved equal).
- ✓ Provide new combustion air intake, direct ducted from the roof for the condensing boiler.

- ✓ New flue gas duct with direct discharge through the roof for both the condensing and cast iron sectional boilers.
- ✓ Removal of (2) 7.5 HP heating hot water system pumps.
- ✓ Installation of (2) new 7.5 HP heating hot water pumps with high efficiency motors and VFDs.
- ✓ Installation of (1) new, boiler circulation, ¾ HP inline pump.
- ✓ Removal of (1) duplex fuel oil pump package.
- ✓ Installation of (1) new duplex fuel oil pump package.
- ✓ Drain, fill and abandon (1) underground fuel oil storage tank.
- ✓ Installation of (1) above ground fuel oil storage tank.
- ✓ New DDC controls for central plant heating equipment as part of ECM 5.A2 Prison Campus Control Upgrades.
- ✓ Full system startup, combustion testing and commissioning.

Air Handling Unit Replacement

A large portion of the 1979 section of the Prison is conditioned by (7) air handling units, primarily located in mechanical penthouses. One (1) of the AHU's is a multi-zone unit and is located in the 1979 mechanical room. The units are original to the facility, and are approximately 34 years old. While in operable condition, the units are showing their age as they are at the end of their life cycle and are beginning to become a maintenance concern. An additional unit has been disconnected and has been used as salvage parts for the remaining (7) operable units.



Existing AHU-3 in Penthouse C201

McClure Company is proposing to remove the (7) AHU's, (4) in Mechanical Penthouse C201, (2) in Mechanical Penthouse F200, and (1) multi-zone AHU located in the 1979 mechanical room. There is also an abandoned unit (AHU-4) in Mechanical Penthouse C201 that will be removed and associated utilities capped. AHU-1, 2, 3, 5, 6 and 7 will be replaced with new units, manufactured by Trane, capable of variable air volume (VAV) operation.

Single zone VAV units, AHU-1, 3 and 5, will vary airflow based on cooling or heating season operation. In addition, AHU-3 will receive CO_2 sensors in the return ductwork to provide a demand control ventilation control sequence that will allow the unit to vary outdoor air (OA) to meet the space requirements. The spaces served by AHU-2 and 6 are already equipped with VAV boxes and VAV terminal diffusers. The VAV terminal diffusers will be replaced with new hot water VAV boxes with DDC controls. All existing VAV boxes will be retrofitted with new direct digital controls (DDC) as part of ECM 5.A2 Prison Campus Control Upgrades.

A new VAV AHU-8 will replace the existing multi-zone unit located in the 1979 mechanical room. The multi-zone duct work will be retrofit with (6) new shutoff type VAV boxes, with hot water reheat. Multi-zone AHU's are inherently high energy users given the need to simultaneously heat and cool each unit airflow deck continuously throughout the year. The new VAV unit will include independently operating heating and cooling coils that can modulate to meet building load, while the terminal VAV boxes provide adequate air volume and any necessary reheat for individual spaces.

Each new unit will have hot water coils designed for 150°F entering water temperature to utilize the water temperature associated with the above mentioned condensing boiler to maintain its high efficiency.

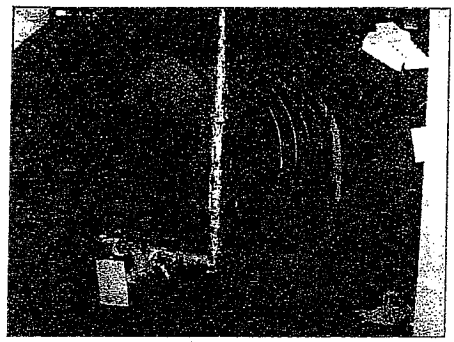
The existing downstream VAV boxes, new VAV boxes, and all the new AHUs will be integrated into the new campus wide control system as proposed in ECM 5.A2.

The general scope of work will include:

- ✓ Remove (8) air handling units.
- ✓ Installation of (7) new air handling units, (4) of which will be single zone VAV with VFD's, (2) will be VAV with VFD's paired with new and existing VAV boxes, and (1) will be a replacement of a Multi-zone with a VAV unit with VFD and paired with new VAV boxes.
- ✓ Full system startup and commissioning.

Penthouse Domestic Hot Water Unit Replacement

Located within the mechanical penthouse C201 are (2) atmospheric style, AO Smith, gas fired domestic water (DW) heaters. The units are of a newer vintage than 1979, however, they are in poor condition. The DW heaters are used in conjunction with a domestic hot water (DHW) storage tank that is also in need of repair. Currently the insulation for the tank is falling off and attempts have been made to strap it back on. The loss of insulation allows the storage tank to radiate heat to the surrounding room and thus requires the DW heaters to work more often.



Existing DHW storage tank

Existing DHW heater connection

McClure Company is proposing to remove the (2) existing AO Smith DW heaters and replace them with (2) new condensing style, 399 MBH, gas fired domestic hot water heaters that will be reconnected to the existing piping and storage tank. The condensing style DW heaters are a great application for DHW given the low incoming water temp and the relatively low temperature water required for DHW storage. The existing storage tank insulation will be removed and the tank will receive new insulation.

The general scope of work will include:

- ✓ Removal of (2) AO Smith gas fired atmospheric water heaters.
- ✓ Installation of (2) Laars gas fired condensing water heaters (or approved equal).
- ✓ Provide new combustion air intake, direct ducted from the roof for (2) domestic hot water heaters.
- ✓ New flue gas duct with direct discharge through the roof for (2) domestic hot water heaters.
- ✓ Removal of existing domestic hot water storage tank insulation.
- ✓ Installation of new insulation on existing domestic hot water storage tank.
- ✓ Full system startup, combustion testing and commissioning.

General Benefits

- ✓ Energy Savings
- ✓ System Reliability
- ✓ Increased Control

Operating Hours

Typical operating hours for this ECM are 8,760 hours per year. AHU's that serve non 24 hour spaces, such as offices, are considered occupied 6:00AM -5:00PM. AHU's that serve non 24 hour spaces such as recreational areas, gyms, etc have also been scheduled for occupancy 6:00AM – 8:00PM.

Energy Savings

Energy savings associated with the Mechanical Room and AHU upgrades are calculated using a custom, 8,760 hour spreadsheet analysis based on facility data, operational parameters, and equipment efficiencies. These inputs are analyzed using ASHRAE standard engineering calculations and bin weather data for the specific project location to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including efficiency increases, system architecture changes, increased control of operation, and standardization of facility set points. The difference between the two analyses is the resulting energy savings for this ECM. The DHW replacement energy savings are calculated using a custom spreadsheet analysis as well; however, the data used in this analysis is determined through typical operational parameters such as run time and efficiency. The analysis is then modified to use the proposed efficiency of the heaters and the resulting difference is the energy savings.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results are then further analyzed to make a determination for the difference.

The savings for this ECM are a result of increased efficiencies (boilers and DW heaters), variable speed pumping arrangements, operational schedule changes where applicable, increased control, variable speed fan operation on AHU's, and demand control ventilation.

Sample Operation and Maintenance Savings Calculations

We were not able to quantify any operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option C as defined by the International Performance Measurement and Verification Protocol (IPMVP). The savings determination will be through comparisons of the baseline utility bills to post construction utility bills.

Verification for the ECM's 1.A2, 2.A2, 3.A2, 4.A2, 5.A2, and 6.A2 will be accomplished through direct comparison of the pre and post construction utility bills, with an adjustment for monthly weather variations and any necessary outdoor air adjustments for code compliance. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage of total utility use that is affected by HDD which is also considered. The baseline energy use has been provided for each building, along with a more detailed M&V description in Schedule L.A2. Outdoor air (OA) adjustments may be required in situations where the existing, measured OA is less than the minimum required by code for the facility. These adjustments utilize standard bin data analysis and industry standard engineering calculations to determine the adjustments and are further explained in Schedule L.A2.

Commissioning Process

Since the HVAC system will undergoing a massive upgrade in terminal equipment, as well as central plant equipment, and it will interface with the new control system, the commissioning process must be of the highest

level and level 3 commissioning is proposed for the Mechanical Room Upgrades and AHU Replacements. Level 3 commissioning is the most detailed and exhaustive application of the commissioning process. Level 3 commissioning is meant to ensure system operation, including all control sequences, is adequately checked and that functional performance is achieved in all respects.

Before any functional testing will occur, the contractor will perform all pre-start up checks and tests.

Level 3 commissioning involves a visual inspection of the installation, system start up check and documentation of start-up procedures, functional testing to ensure integrated operating systems function as designed, customer attendance and sign off that all functional tests have been completed and the system operation meets expectations.

The DHW Replacement commissioning will be part of this process however, will only be Level 2, and will not require functional testing.

The commissioning plan can be found in Attachment C.A2.

Equipment Training

A total of twenty (20) hours of training is proposed for all new mechanical equipment in ECM's 1.A2, 2.A2, 3.A2, and 4.A2. Control training will also be provided, and is outlined in ECM 5. The training will include, but not be limited to: routine maintenance requirements, general operation, and system locations/warranty.

Warranty Information

There is a warranty period of 1 year on installation and workmanship.

ECM 2.A2 – Prison 1992 Mechanical Upgrades

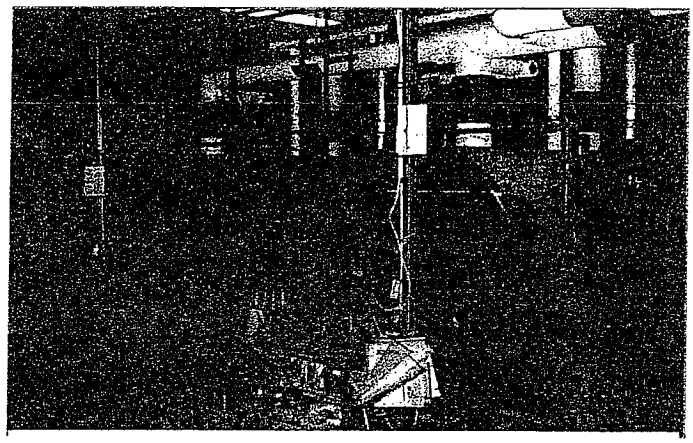
Areas Implemented

- ✓ Prison 1992 Section

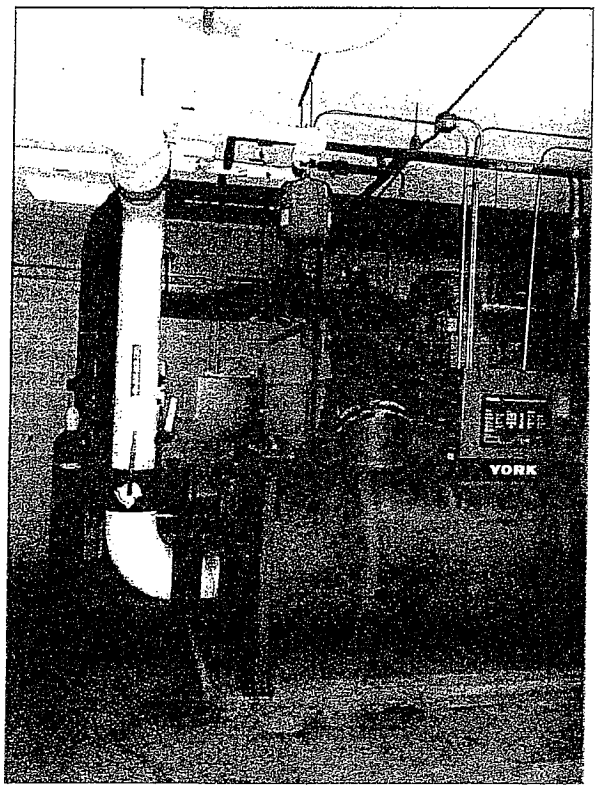
Proposed Solution

Mechanical Room Upgrades

The existing heating central plant for the 1992 section of the Prison is served by (2) 60 BHP Burnham dual fuel (oil and natural gas) hot water boilers with (2) 7.5 HP heating hot water system pumps and (2) 5 HP heating hot water system pumps. The cooling central plant consists of a York water cooled centrifugal chiller, BAC cooling tower, (2) 20 HP chilled water system pumps and (2) 10 HP chilled water system pumps. Domestic hot water is provided by (2) atmospheric AO Smith DW heaters. All equipment is in operable condition and original to the 1992 expansion, giving it a vintage of 20 years.



Existing Burnham boilers



Existing York centrifugal chiller

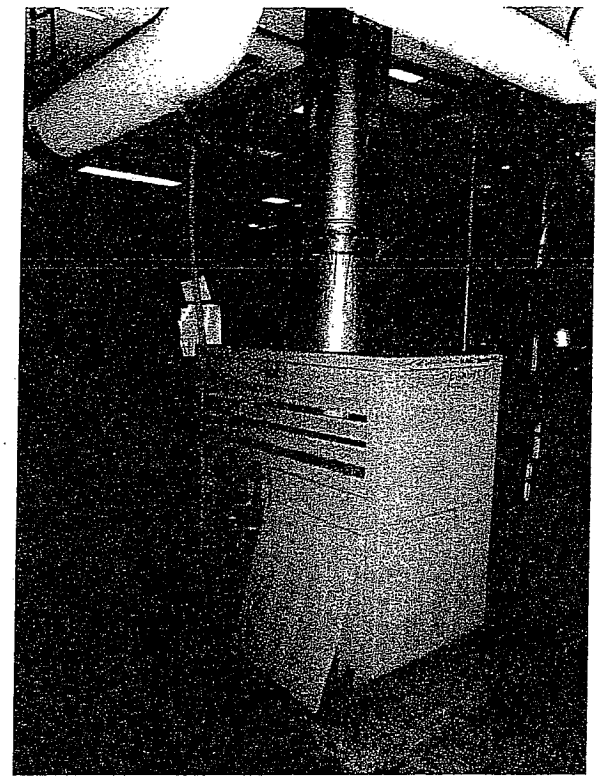
McClure Company is proposing to remove both Burnham boilers and install (1) new Patterson-Kelly MACH C2500 condensing style gas boiler and (1) dual fuel, 60 BHP Weil McClain cast iron sectional boiler to provide the necessary redundancy and dual fuel capabilities required by the facility. The condensing boiler will be designed to generate 150°F hot water. The cast iron sectional boiler will be capable of producing up to 180°F water, if needed, based on the building reset schedule. A ¾ HP inline pump will be installed in the branch piping of the cast iron sectional boiler to continuously circulate higher temperature boiler water. Also, the (2) existing 7.5 HP and (2) 5 HP, heating hot water system pumps will be replaced in kind with pumps with high efficiency motors and variable frequency drives (VFDs).

McClure Company is also proposing to remove the York centrifugal chiller and replace it in kind with a new 285 ton Trane centrifugal chiller. The existing (2) 20 HP and (2) 10 HP chilled water system pumps will be replaced in kind with pumps featuring high efficiency motors and VFDs.

Finally, McClure Company is proposing to remove (2) AO Smith DW heaters and replace them with (2) condensing style, 850 MBH gas DW heaters. The new DW heaters will be reconnected to the existing piping and storage tank located in the mechanical room.

The general scope of work will include:

- ✓ Removal of (2) Burnham dual fuel Boilers
- ✓ Installation of (1) new PK MACH gas fired condensing boiler (or approved equal).
- ✓ Installation of (1) new Weil McClain dual fuel cast iron sectional boiler (or approved equal).
- ✓ Provide new combustion air intake, direct ducted from the roof for (1) condensing boiler and (2) domestic hot water heaters.
- ✓ New flue gas duct with direct discharge through the roof for both (1) condensing boiler, (1) cast iron sectional boiler and (2) domestic hot water heaters.
- ✓ Removal of (2) 7.5 HP heating hot water system pumps.
- ✓ Removal of (2) 5 HP heating hot water system pumps.
- ✓ Removal of (2) 20 HP chilled water system pumps.
- ✓ Removal of (2) 10 HP chilled water system pumps.
- ✓ Installation of (2) new 7.5 HP heating hot water pumps with high efficiency motors and VFDs.
- ✓ Installation of (2) new 5 HP heating hot water pumps with high efficiency motors and VFDs.



Existing AO Smith atmospheric DHW heater

- ✓ Installation of (2) new 20 HP chilled water pumps with high efficiency motors and VFDs.
- ✓ Installation of (2) new 10 HP chilled water pumps with high efficiency motors and VFDs.
- ✓ Installation of (1) new, boiler circulation, ¾ HP inline pump.
- ✓ Removal of (1) York centrifugal chiller.
- ✓ Installation of (1) new Trane centrifugal chiller (or approved equal).
- ✓ Removal of (2) AO Smith gas fired atmospheric water heaters.
- ✓ Installation of (2) Laars gas fired condensing water heaters (or approved equal).
- ✓ New DDC controls for central plant heating equipment as part of ECM 5.A2 Prison Campus Control Upgrades.
- ✓ Full system startup, combustion testing and commissioning.

Constant Volume Air Handling Unit Retrofit

As in the 1979 section of the Prison, the 1992 section is also primarily conditioned by (11) air handling units (AHUs). These AHU's are located in various mechanical penthouses throughout the 1992 addition. The units are original to the 1992 expansion and are approximately 20 years old. The units are in operable condition and the benefit to replacing the units is marginal. The units are in better shape than most of those being replaced in ECM 1.A2 and still have some useful life remaining. There is also (1) kitchen make up air (MUA) unit.

McClure Company is proposing to retrofit the (11) existing AHU's with new high efficiency fan motors connected to a new variable frequency drive (VFD). Single zone VAV units, AHU-9, 10, 11, 12, 14, 17, 18, 19 and 20 will vary airflow based on cooling or heating season operation. In addition to the ability for the fan power to modulate based on space conditions (single zone VAV), AHU-14 and 18 will also receive CO_2

sensors in the return ductwork to allow for implementation of demand control ventilation (DCV). DCV allows the outdoor air (OA) intake to modulate based on space occupant load conditions through measurement of CO_2 (in ppm) in the return air stream. This allows the unit to bring in only as much outside air as needed but no less than the code required minimum. The spaces served by AHU-15 and AHU-16 are presently equipped with VAV boxes. The existing to remain VAV boxes will be retrofitted with DDC controls. All AHU's and VAV boxes will be integrated into the new campus wide DDC automation system in ECM 5.A2.

The general scope of work will include:

- ✓ Remove (11) supply air fan motors from existing AHU-9, AHU-10, AHU-11, AHU-12, AHU-14, AHU-15, AHU-16, AHU-17, AHU-18, AHU-19 and AHU-20.
- ✓ Install (11) new premium efficiency motors with VFDs for existing AHU-9 (10 HP), AHU-10 (15 HP), AHU-11 (10 HP), AHU-12 (7.5 HP), AHU-14 (2 HP), AHU-15 (3 HP), AHU-16 (10 HP), AHU-17 (10 HP), AHU-18 (2 HP), AHU-19 (7.5 HP) and AHU-20 (7.5 HP).
- ✓ New DDC controls for air handling equipment.
- ✓ Full system startup and commissioning.

General Benefits

- ✓ Energy Savings
- ✓ System Reliability
- ✓ Increased Control

Operating Hours

Typical operating hours for this ECM are 8,760 hours per year. AHU's that serve non 24 hour spaces, such as offices, are considered occupied 6:00AM -5:00PM. AHU's that serve non 24 hour spaces such as recreational areas, gyms, etc have also been scheduled for occupancy 6:00AM – 8:00PM.

Energy Savings

Energy savings associated with the Mechanical Room and Constant Volume AHU Retrofit are calculated using a custom, 8,760 hour spreadsheet analysis based on facility data, operational parameters, and equipment efficiencies. These inputs are analyzed using ASHRAE standard engineering calculations and bin weather data for the specific project location to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including efficiency increases, system architecture changes, increased control of operation, and standardization of facility set points. The difference between the two analyses is the resulting energy savings for this ECM. The DHW replacement energy savings are calculated using a custom spreadsheet analysis as well, however, the data used in this analysis is determined through typical operational parameters such as run time and efficiency. The analysis is then modified to use the proposed efficiency of the heaters and the resulting difference is the energy savings.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results in then further analyzed to make a determination for the difference.

The savings for this ECM are a result of increased efficiencies (chiller and DHW heaters), variable speed pumping arrangements, operational schedule changes where applicable, increased control, variable speed fan operation on AHU's, and demand control ventilation.

Sample Operation and Maintenance Savings Calculations

We were not able to quantify any operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option C as defined by the International Performance Measurement and Verification Protocol (IPMVP). The savings determination will be through comparisons of the baseline utility bills to post construction utility bills.

Verification for the ECM's 1.A2, 2.A2, 3.A2, 4.A2, 5.A2, and 6.A2 will be accomplished through direct comparison of the pre and post construction utility bills, with an adjustment for monthly weather variations and any necessary outdoor air adjustments for code compliance. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage of total utility use that is affected by HDD which is also considered. The baseline energy use has been provided for each building, along with a more detailed M&V description in Schedule L.A2. Outdoor air (OA) adjustments may be required in situations where the existing, measured OA is less than the minimum required by code for the facility. These adjustments utilize standard bin data analysis and industry standard engineering calculations to determine the adjustments and are further explained in Schedule L.A2.

Commissioning Process

Since the HVAC system will undergoing a massive upgrade in terms of the central plant equipment, and it will interface with the new control system, the commissioning process must be of the highest level and level 3 commissioning is proposed for the Mechanical Room Upgrades and Constant Volume AHU Retrofits. Level 3 commissioning is the most detailed and exhaustive application of the commissioning process. Level 3 commissioning is meant to ensure system operation, including all control sequences, is adequately checked and that functional performance is achieved in all respects.

Before any functional testing will occur, the contractor will perform all pre-start up checks and tests.

Level 3 commissioning involves a visual inspection of the installation, system start up check and documentation of start-up procedures, functional testing to ensure integrated operating systems function as designed, customer attendance and sign off that all functional tests have been completed and the system operation meets expectations.

The DHW Replacement, as part of the Mechanical Room Upgrades, commissioning will be part of this process however, will only be Level 2, and will not require functional testing.

The commissioning plan can be found in Attachment C.A2.

Equipment Training

A total of twenty (20) hours of training is proposed for all new mechanical equipment in ECM's 1.A2, 2.A2, 3.A2, and 4.A2. Control training will also be provided, and is outlined in ECM 5. The training will include, but not be limited to: routine maintenance requirements, general operation, and system locations/warranty.

Warranty Information

There is a warranty for a period of 1 year on installation and workmanship. Compressors carry a five year warranty from the manufacturer.

ECM 3.A2 – Prison 1998 Mechanical Upgrades

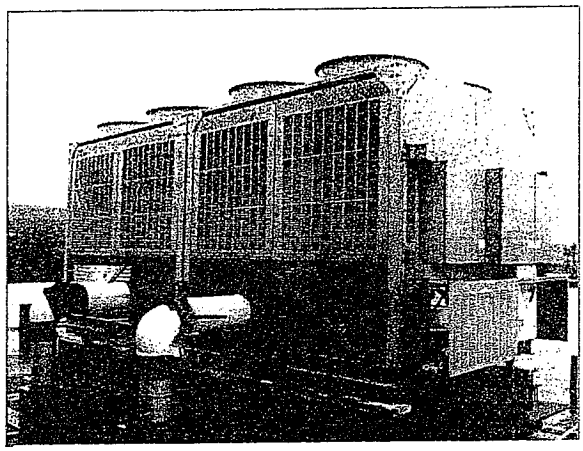
Areas Implemented

- ✓ Prison 1998 Section

Proposed Solution

Mechanical Room Upgrades

The existing central plant for the 1998 section of the Prison is served by (2) 100 BHP Burnham dual Fuel (oil and natural gas), hot water boilers with (2) constant volume 15 HP building loop pumps. Cooling is currently provided by (2) fully redundant, 167 ton, York packaged air cooled chillers with reciprocating compressors, (2) 20 HP chilled water secondary building loop pumps, and (2) 7.5 HP chilled water primary loop pumps. The majority of the occupied space is conditioned by (7) air handling units (AHUs). Two (2) make up air units (MUAs) provide 100% outdoor air (OA) for makeup in the dryer equipment room and Kitchen J110. All equipment appears to be in good operating condition and has many years of useful life remaining.



Existing York packaged air cooled chiller (typical of 2)

McClure Company is proposing to replace the (2) York packaged air cooled chillers located outside of the mechanical air handling room. These roof mounted air cooled chillers, while still operational, are prone to mechanical issues with the reciprocating compressors. Also, the reciprocating compressors from this vintage offer an opportunity for an increase in efficiency with new air cooled rotary screw chillers. The (2) chillers will be replaced with (2) new, roof mounted Trane rotary screw air cooled chillers. To further optimize the chilled water system, McClure Company is proposing to add variable frequency drives (VFDs) to the (2) existing 20 HP chilled water secondary building loop pumps to allow for modulation of pumping power to meet the system need rather than supplying a constant volume of water. The 3-way chilled water control valves will be replaced at three locations, all on existing AHUs, with new 2-way control valves to convert the system to variable flow.

The general scope of work will include:

- ✓ Removal of (2) York packaged air cooled chillers.
- ✓ Installation of (2) new Trane packaged air cooled chillers (or approved equal).
- ✓ Installation of (2) new VFDs on existing secondary chilled water pumps.
- ✓ New DDC controls for central plant cooling equipment.
- ✓ Full system startup and commissioning.

Constant Volume Air Handling Unit Retrofit

As with the two previous sections, the 1998 section is primarily conditioned by (7) AHU's. These AHUs are located in various mechanical rooms throughout the addition. The units are approximately 14 years old and in good operating condition with no benefit in replacement. There are also (2) MUA units serving a kitchen and dryer make up. All units are existing to remain.

McClure Company is proposing to retrofit (4) of these AHUs with new supply air fan and return air fan motors, (8) total motors, equipped with variable frequency drives (VFDs). Using the new control system, the previously constant volume AHUs will be converted to variable air volume (VAV) units (single zone VAV), thus allowing for modulation of supply and return air based on cooling or heating season operation.

All AHUs and central plant equipment will be integrated into the new DDC automation system as described in ECM 5.A2.

The general scope of work will include:

- ✓ Remove (4) supply air fan motors and (4) return air fan motors from existing AHU-23, 24, 25, and 26.
- ✓ Install (8) new premium efficiency motors with VFDs for existing AHU-23 (30 HP & 15 HP), AHU-24 (30 HP & 15 HP), AHU-25 (15 HP & 7.5 HP), and AHU-26 (15 HP & 7.5 HP).
- ✓ New DDC controls for air handling equipment.
- ✓ Full system startup and commissioning

General Benefits

- ✓ Energy Savings
- ✓ System Reliability
- ✓ Increased Control

Operating Hours

Typical operating hours for this ECM are 8,760 hours per year. AHU's that serve non 24 hour spaces, such as offices, are considered occupied 6:00AM -5:00PM. AHU's that serve non 24 hour spaces such as recreational areas, gyms, etc have also been scheduled for occupancy 6:00AM – 8:00PM.

Energy Savings

Energy savings associated with the Mechanical Room and Constant Volume AHU Retrofit are calculated using a custom, 8,760 hour spreadsheet analysis based on facility data, operational parameters, and equipment efficiencies. These inputs are analyzed using ASHRAE standard engineering calculations and bin weather data for the specific project location to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including efficiency increases, system architecture changes, increased control of operation, and standardization of facility set points. The difference between the two analyses is the resulting energy savings for this ECM.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results in then further analyzed to make a determination for the difference.

The savings for this ECM are a result of increased efficiency (chiller), variable speed pumping arrangements, operational schedule changes where applicable, increased control, and variable speed fan operation on AHU's.

Sample Operation and Maintenance Savings Calculations

We were not able to quantify any operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option C as defined by the International Performance Measurement and Verification Protocol (IPMVP). The savings determination will be through comparisons of the baseline utility bills to post construction utility bills.

Verification for the ECM's 1.A2, 2.A2, 3.A2, 4.A2, 5.A2, and 6.A2 will be accomplished through direct comparison of the pre and post construction utility bills, with an adjustment for monthly weather variations and any necessary outdoor air adjustments for code compliance. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage

of total utility use that is affected by HDD which is also considered. The baseline energy use has been provided for each building, along with a more detailed M&V description in Schedule L.A2. Outdoor air (OA) adjustments may be required in situations where the existing, measured OA is less than the minimum required by code for the facility. These adjustments utilize standard bin data analysis and industry standard engineering calculations to determine the adjustments and are further explained in Schedule L.A2.

Commissioning Process

Although the HVAC system will undergo only minor upgrades in terms of the central plant equipment, and it will interface with the new control system, and therefore the commissioning process must be of the highest level and level 3 commissioning is proposed for the Mechanical Room Upgrades and Constant Volume AHU Retrofits. Level 3 commissioning is the most detailed and exhaustive application of the commissioning process. Level 3 commissioning is meant to ensure system operation, including all control sequences, is adequately checked and that functional performance is achieved in all respects.

Before any functional testing will occur, the contractor will perform all pre-start up checks and tests.

Level 3 commissioning involves a visual inspection of the installation, system start up check and documentation of start-up procedures, functional testing to ensure integrated operating systems function as designed, customer attendance and sign off that all functional tests have been completed and the system operation meets expectations.

The commissioning plan can be found in Attachment C.A2.

Equipment Training

A total of twenty (20) hours of training is proposed for all new mechanical equipment in ECM's 1.A2, 2.A2, 3.A2, and 4.A2. Control training will also be provided, and is outlined in ECM 5. The training will include, but not be limited to: routine maintenance requirements, general operation, and system locations/warranty.

Warranty Information

There is a warranty for a period of 1 year on installation and workmanship.

ECM 4.A2 – Prison 2005 Mechanical Upgrades

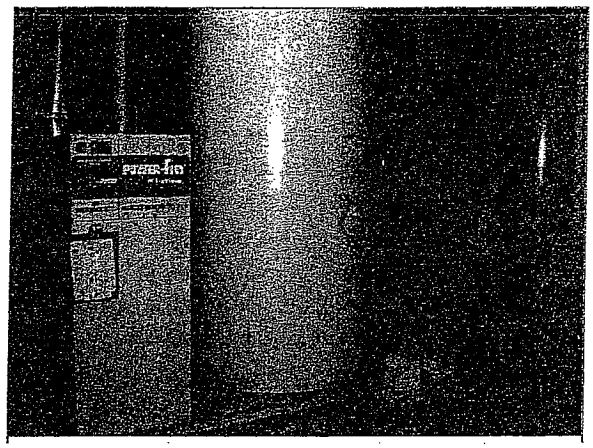
Areas Implemented

- ✓ Prison 2005 Section

Proposed Solution

Mechanical Room Upgrades

The existing central plant for the 2005 section of the Prison is served by (2) 100 BHP Smith cast iron sectional dual fuel (oil and natural gas), hot water boilers with (2) constant volume 5 HP building loop pumps. This section of the prison is primarily conditioned by packaged roof top units (RTUs) that have integral direct expansion (DX) cooling. Domestic hot water is provided by (2) atmospheric Lochinvar Power Fin gas fired water heaters. While all major central heating plant equipment and RTUs appear to be in good operating condition, the DHW heaters have presented numerous maintenance issues in the past due to their design. It is recommended to replace the DW heaters.



Existing Lochinvar DHW heaters

McClure Company is proposing to remove (2) existing Lochinvar DW heaters and replace them with (2) new condensing style, 850 MBH gas fired DW heaters. The new condensing style DW heaters will be reconnected to the existing piping and storage tank.

Additionally all central plant and major terminal equipment will be integrated into the new DDC automation system proposed in ECM 5.

The general scope of work will include:

- ✓ Removal of (2) Lochinvar gas fired atmospheric water heaters.
- ✓ Installation of (2) Laars gas fired condensing water heaters (or approved equal).
- ✓ New flue gas duct with direct discharge through the wall for (2) domestic hot water heaters.
- ✓ New DDC controls for central plant equipment.
- ✓ Full system startup, combustion testing and commissioning.

General Benefits

- ✓ Energy Savings
- ✓ System Reliability
- ✓ Reduced Maintenance

Operating Hours

Typical operating hours for this ECM are 8,760 hours per year.

Energy Savings

Energy savings associated with this ECM are calculated using a custom, spreadsheet analysis based on operational parameters, such as run time, and equipment efficiencies. These inputs are analyzed using ASHRAE standard engineering calculations to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including efficiency increases. The difference between the two analyses is the resulting energy savings for this ECM.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results in then further analyzed to make a determination for the difference.

The savings for this ECM are a result of increased efficiencies.

Sample Operation and Maintenance Savings Calculations

We were not able to quantify any operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option C as defined by the International Performance Measurement and Verification Protocol (IPMVP). The savings determination will be through comparisons of the baseline utility bills to post construction utility bills.

Verification for the ECM's 1.A2, 2.A2, 3.A2, 4.A2, 5.A2, and 6.A2 will be accomplished through direct comparison of the pre and post construction utility bills, with an adjustment for monthly weather variations and any necessary outdoor air adjustments for code compliance. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage of total utility use that is affected by HDD which is also considered. The baseline energy use has been provided for each building, along with a more detailed M&V description in Schedule L.A2. Outdoor air (OA) adjustments may be required in situations where the existing, measured OA is less than the minimum required by code for the facility. These adjustments utilize standard bin data analysis and industry standard engineering calculations to determine the adjustments and are further explained in Schedule L.A2.

Commissioning Process

The new DHW heaters will act as an independent system and are not a component of a larger integrated system, therefore the appropriate level of commissioning is level 2. Level 2 commissioning is intended to include comprehensive pre-start check up and testing to ensure the contractor meets basic contractual requirements to produce a fully functioning independent system.

The commissioning plan can be found in Attachment C.A2.

Equipment Training

A total of twenty (20) hours of training is proposed for all new mechanical equipment in ECM's 1.A2, 2.A2, 3.A2, and 4.A2. Control training will also be provided, and is outlined in ECM 5. The training will include, but not be limited to: routine maintenance requirements, general operation, and system locations/warranty.

Warranty Information

There is a warranty for a period of 1 year on installation and workmanship.

ECM 5.A2 – Prison Campus Control Upgrades

Areas Implemented

✓ Prison

Proposed Solution

The existing control system at the Prison consists of pneumatic controls and various automation systems implemented during each expansion, all operating independently of each other and with limited operator interface. The operator interface prevents simple tasks, such as scheduling or set point adjustment, from occurring. McClure Company is proposing a DDC new automation system manufactured by Schneider Electric (formerly Invensys Controls) provided through NRG Controls. All sections/additions (1979, 1992, 1998, and 2005) of the prison will be included in the new automation prison, allowing the operator to immediately view operation of the heating or cooling system along with individual air handler operation in any section of the prison.

The new automation system will include a new graphical interface with web access capability. A graphical interface allows an operator to view the complete operation of individual components (air handlers, hot water system, etc.) of the mechanical system as presently occurring, thus making diagnosis of problems a much easier task. If remote access is allowed, an assigned operator could check on the entire prison mechanical system from anywhere with internet access. The system is also very secure, as only operators with proper clearances that are programmed into the graphical interface server will be allowed access. Remote access can also be denied to all operators for security reasons.

As automation systems improved with time, very important functions such as time scheduling and set point adjustment became much easier for an operator to adjust. Set point adjustment can now be changed simply by highlighting the thermostat and typing in a set point over ride. Scheduling can be done by highlighting the proper schedule and moving a slider for the new scheduled time, and for each day of the week. Historical trending and retrieval of stored data information can provide insight into system operation and improved diagnostic capabilities.

For each section of the prison a list and quantity of units or systems that will get a controls upgrade is listed below. Following the equipment list, a breakout of the points list assigned to each piece of equipment is listed.

1979

Description	Quantity
Hot water System	1
HW Pump with VFD	2
HW zone pumps	3
HW reset valve	1
Condensing Boiler	1
Dual fuel Boiler	1
Chilled water System	1
Existing chiller	1
Chilled Water pumps	2
Zone pumps	4
Single Zone VAV air handler	4
Variable speed air handler	2
Variable air volumes boxes	35
Domestic HW monitoring	1
Fan Coil Units	3
Exhaust Fans	3

1992

Description	Quantity
Hot water System	1
HW Pump with VFD	2
Primary HW pumps	2
HW reset valve	1
Condensing Boiler	1
Dual fuel Boiler	1
Chilled water System	1
Existing chiller	1
Chilled Water pumps with VFD	4
Cooling Tower	1
Single Zone VAV air handler	8
Variable speed air handler	2
Constant Volume air handler	2
Variable air volumes boxes	22
Domestic HW Monitoring	2
Fan Coil Units	1
Exhaust Fans	9

1998

Description	Quantity
Hot water System	1
Primary HW pumps	2
Dual fuel Boiler	2
Chilled water System	1
New chiller	2
Chilled Water pumps with VFD	4
Single Zone VAV air handler	4
Variable speed air handler	2
Constant Volume air handler	2
Variable air volumes boxes	30
HW duct Coils	34
Domestic HW Monitoring	1
Fan Coil Units	5
Exhaust Fans	8
Smoke Exhaust fans	8

2005

Description	Quantity
Hot water System	1
Primary HW pumps	2
Dual fuel Boiler	2
Roof top units	11
Variable air volumes boxes	20
Domestic HW Monitoring	1
Exhaust Fans	12
Smoke Exhaust fans	6

System Description

Hot Water System	AI	AO	DI	DO
Hot water supply temperature	x			
Hot water return temperature	x			
Hot water temperature set point		x		
Three way re-set valve		x		
Existing boiler:				
Stop/start				x
Status			x	
Alarm			x	
New condensing boiler:				
Stop/start				x
Status			x	
Alarm:				
Modulating output		x		
Hot water pumps:				
Stop/start				x
Status			x	
Speed control (VFD only)		x		
Differential pressure (VFD only)	x			

Chilled Water System	AI	AO	DI	DO
Chilled water supply temperature	x			
Chilled water return temperature	x			
Chilled water set point		x		
Chiller stop/start stage 1				x
Chiller stop/start stage 2				x
Chiller status stage 1			x	
Chiller status stage 2			x	
Water cooled chiller:				
Condenser pump 1 stop/start				x
Condenser pump 1 status			x	
Condenser pump 2 stop/start				x
Condenser pump 2 status			x	
Condenser water temperature	x			
Cooling tower damper		x		
Cooling tower fan control				x
Cooling tower sump pump				x
Chilled water pump 1 stop/start				x
Chilled water pump 1 status			x	
Chilled water pump 2 speed control (VFD only)	x			
Chilled water pump 2 stop/start				x
Chilled water pump 2 status			x	

VAV Air Handler	AI	AO	DI	DO
Return air temperature	x			
Mixed air temperature	x			
Discharge air temperature	x			
Mixed air damper		x		
Hot water (steam) valve		x		
Chilled water valve		x		
Low temperature alarm			x	
Smoke detector shut down			x	
High static shut down			x	
Fan stop/start				x
Fan status			x	
Fan speed control		x		
Discharge static pressure	x			

VAV Box	AI	AO	DI	DO
CFM	x			
CFM set points (cooling, minimum, and heating)		x		
Hot water valve		x		
Space temperature	x			
Discharge air temperature	x			

VAV Box (no flow ring)	AI	AO	DI	DO
Hot water valve		x		
Damper Actuator		x		
Space temperature	x			
Discharge air temperature	x			

Single Zone Air Handler	AI	AO	DI	DO
Mixed air temperature	x			
Discharge air temperature	x			
Mixed air damper		x		
Hot water (steam) valve		x		
Chilled water valve		x		
Low temperature alarm			x	
Smoke detector shut down			x	
High static shut down			x	
Fan stop/start				x
Fan status			x	
Fan speed control		x		
Discharge static pressure	x			

Constant Volume Air Handler	AI	AO	DI	DO
Mixed air temperature	x			
Discharge air temperature	x			
Mixed air damper		x		
Hot water (steam) valve		x		
Chilled water valve		x		
Low temperature alarm			x	
Smoke detector shut down			x	
Fan stop/start				x
Fan status			x	

Duct Coil	AI	AO	DI	DO
Hot water valve		x		
Space temperature	x			
Discharge air temperature	x			

Exhaust Fan	AI	AO	DI	DO
Fan stop/start				x
Fan status			x	

General Benefits

- ✓ Energy Savings
- ✓ System Reliability
- ✓ Increased Control
- ✓ Trouble shooting

Operating Hours

Typical operating hours for this ECM are 8,760 hours per year. AHU's that serve non 24 hour spaces, such as offices, are considered occupied 6:00AM -5:00PM. AHU's that serve non 24 hour spaces such as recreational areas, gyms, etc have also been scheduled for occupancy 6:00AM – 8:00PM.

Energy Savings

Energy savings associated with the Prison Campus Control Upgrade are calculated using a custom, 8,760 hour spreadsheet analysis based on facility data and operational parameters. These inputs are analyzed using ASHRAE standard engineering calculations and bin weather data for the specific project location to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including efficiency increases, system architecture changes, increased control of operation, and standardization of facility set points. The difference between the two analyses is the resulting energy savings for this ECM. The DHW replacement energy savings are calculated using a custom spreadsheet analysis as well; however, the data used in this analysis is determined through typical operational parameters such as run time and efficiency. The analysis is then modified to use the proposed efficiency of the heaters and the resulting difference is the energy savings.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results are then further analyzed to make a determination for the difference.

The energy savings associated with the Prison Campus Control Upgrade create a unique situation in terms of definition of savings given the integration into other ECM's. Much of the energy savings with the controls upgrade has been included in the above described ECM's (1.A2, 2.A2, 3.A2, and 4.A2) and to obtain such savings, the installation of the control system is necessary. These measures include control of the variable speed pumping and AHU fans, demand control ventilation, and VAV box control. However, additional system wide savings have been applied to this ECM given the ability to schedule non 24 hour spaces, such as office and recreational areas. These measures are deemed the savings for the control system outside the benefits listed in the other ECM's above.

Overall, the savings for this ECM are a result of variable speed pumping arrangements, operational schedule changes where applicable, increased control, variable speed fan operation on AHU's, and demand control ventilation operation.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option C as defined by the International Performance Measurement and Verification Protocol (IPMVP). The savings determination will be through comparisons of the baseline utility bills to post construction utility bills.

Verification for the ECM's 1.A2, 2.A2, 3.A2, 4.A2, 5.A2, and 6.A2 will be accomplished through direct comparison of the pre and post construction utility bills, with an adjustment for monthly weather variations and any necessary outdoor air adjustments for code compliance. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage of total utility use that is affected by HDD which is also considered. The baseline energy use has been provided for each building, along with a more detailed M&V description in Schedule L.A2. Outdoor air (OA) adjustments may be required in situations where the existing, measured OA is less than the minimum required by code for the facility. These adjustments utilize standard bin data analysis and industry standard engineering calculations to determine the adjustments and are further explained in Schedule L.A2.

Commissioning Process

Since the new control system will provide interface to nearly all of the proposed ECMs at the Prison, the commissioning process must be of the highest level and level 3 commissioning is proposed. Level 3 commissioning is the most detailed and exhaustive application of the commissioning process. Level 3 commissioning is meant to ensure system operation, including all control sequences, is adequately checked and that functional performance is achieved in all respects.

Level 3 commissioning involves a visual inspection of the installation, system start up check and documentation of start-up procedures, functional testing to ensure integrated operating systems function as designed, customer attendance and sign off that all functional tests have been completed and the system operation meets expectations.

Equipment Training

A total of (24) twenty four hours of onsite training has been proposed for the Prison control system. The training will be split, with (16) sixteen hours of training following completion that will include but not be limited to: control strategy, graphical interface, and collection of historical data. The remaining (8) hours of training will be supplied 6 months to 1 year after completion during the alternate weather season to provide a refresher of the above covered topics as well as to demonstrate the control strategy for energy savings during the weather season at that time. Training will be provided by a fully trained instructor from the controls manufacturer as well as attendance by a McClure representative.

Warranty Information

There is a warranty of 1 year on installation and workmanship. The labor warranty includes properly functioning control sequences.

ECM 6.A2 – Prison Water Conservation

Areas Implemented

✓ Prison

Proposed Solution

Low Security High Flow Toilets and Urinal Upgrades

The existing low security areas, such as common areas and general public/office areas, are served by standard, high flow fixtures, many of which are original to the area of the Prison where they are located. Even replacements of these fixtures seem to include high flow valves and fixtures. High flow toilets have flush rates equal to or above 3.5 gallons per flush (GPF), and high flow urinals are equal to or exceed 1.5 GPF. Typical low flow toilets have a GPF of 1.6 while urinal can range from 0.5 to 1 GPF.

The 1979 section has (44) of the standard high flow toilets with a majority as manufactured by American Standard with Sloan or Zurn flush valves. There is also (1) high flow, full height, American Standard urinal.

The 1992 section has (22) toilet fixtures of which (18) are standard high flow toilets, and there are no high flow urinals. Flush valves are Delany or Sloan.

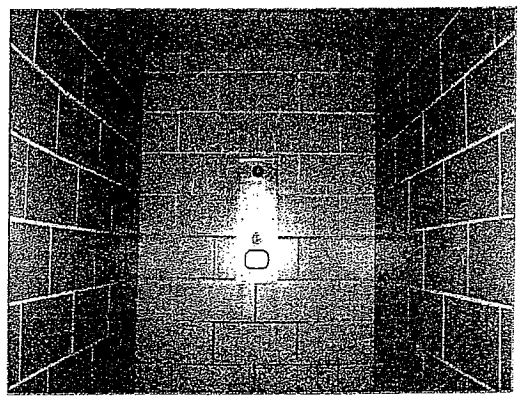
The 1998 section has (66) toilet fixtures that are standard high flow, as manufactured by American Standard. There is also (1) Kohler, full height urinal with a high flow Sloan flush valve.

The 2005 section has (43) toilet and (2) urinal fixtures of which (30) toilet and (2) urinals incorporate high flow flush valves by Zurn.

In total McClure Company is proposing to retrofit (158) of the (175) toilets with new fixtures as manufactured by Crane with Zurn, manual flush valves, or approved equal fixture/valve set. The new flush rate will be 1.6 GPF maximum. The new fixtures will match the existing mounting hardware to the unit replaced and with have manual flush valves. Replacement of the fixture is required to accommodate the lower flow of the flush valve and maintain unit operation. Also, McClure Company is proposing to replace flush valves only on the (4) high flow urinals listed above. In the case of urinals a fixture replacement is not necessary, therefore only the flush valve will be replaced with a new Zurn low flow manual flush valve or approved equal. The new flush rate will be 1.0 GPF maximum.

ICON Shower System

McClure Company is proposing to replace (200) of the high flow (3.0 GPM) inmate showerheads throughout the building with controllable low flow units (2.0 GPM).

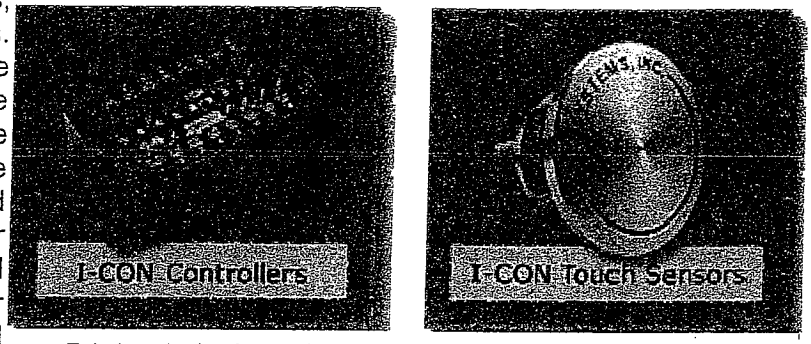


Aside from daily shower use, we also discovered the inmates are utilizing the hot water to warm food purchased from the canteen. The facilities personnel also stated many of the showers are left on as long as 24 hours. The excessive use of hot water has a significant impact on the amount of thermal energy consumed.

To reduce the amount of thermal energy we are proposing to replace each shower head unit with a low flow electronically controllable unit. Initially, each shower will be programmed to operate for 3 minutes with the ability to override for an additional 3 minutes. Following the second use, the shower will not be able to operate for one hour. Each of these parameters can be adjusted as needed.

The controller is an electronic device that manages the operation of plumbing valves. When an input signal is received from a sensor, the controller sends an output signal to the solenoid directing it t o open the valve it is attached to and then to close the valve again after a pre-programmed time, depending on the application.

Controllers can operate showers, lavatories, toilets and any other controlled water devices that are required. Controllers are sized to handle from one to multiple applications and are available in battery and 24 VAC versions. Controllers can also be networked together and then can be linked to a central control computer system that allows for lockdowns, searches, data collection, and other enhanced features. The solenoid receives output signals from the controller, and the solenoid operates the valve it's controlling. The length of time they operate the associated valve depending on the application (toilet, shower, etc.). Each solenoid comes standard with a 6' cable, with other lengths available. For this ECM the solenoid will be hard wired to an outlet or 24 VAC transformer in the plumbing chase where the shower control will be located.



Existing single shower head and proposed controls components


Male inmate washers to receive ozone system

Male Inmate Laundry Ozone System

McClure Company is proposing to install an ozone-based laundry system designed to reduce both cold and hot water cycles for the laundry washers.

Currently, there are five (5) 60-pound capacity Pellering Milnor washing machines at the Prison that have been identified as good candidates for retrofit with an ozone system. The washing machines use several different programs for the different wash materials they process. Each program has a series of fills and drains using either hot or cold water plus chemicals appropriate for the type of program and washer being used. The systems to be installed are based on design by Aquawing, and will include (2) systems. One system will control on (3) units while the other handles the remaining (2) units. The systems will feature interface control modules that will allow for "variable ozone" technology that adjusts the amount of ozone based on soil level.

With the application of ozone, the system will also be incorporating disinfection protection of linen during the wash operation. The system destroys microorganisms such as Aspergillus niger and other fungi; Staphylococcus; Bacillus megaterium; and E. coli, among many others. In addition to water, energy, and chemical savings, the use of ozone in laundries also reduces linen replacement costs by reducing chlorine in the washing cycle. (Chlorine is a key contributor to linen degradation.)

An ozone system will be installed for the five washing machines. Current methods of chemical soil removal require temperatures ranging from 140 to 170°F. Depending on the type of material being washed, ozone, a powerful oxidizing agent, will reduce the required temperature to between 100 and 130°F and completely eliminate the need for heat in some cycles. This is due to the addition of ozone, which makes the washing process more efficient. This creates a reduced run time and corresponding reduction in electricity consumption will occur. In addition, the oxidizing effect reduces soil levels allowing for reduced chemicals and lower fill levels or elimination of whole cycles from a program.

General Benefits

- ✓ Energy Savings
- ✓ Water Savings
- ✓ Operational Savings

Operating Hours

Operating hours for this ECM are based on approximately 3,000 hours per year. This equates to approximately 8.5 hours of washing per day, 365 days per year.

Energy Savings

Energy savings associated with the high flow fixture upgrades and ICON system are calculated using a custom, spreadsheet analysis based on operational parameters, such as daily use, population and demographics, as well as flush/flow rates and equipment efficiencies. These inputs are analyzed using ASHRAE standard engineering calculations to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including restricted flush/flow rates. The difference between the two analyses is the resulting energy savings for this ECM.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results in then further analyzed to make a determination for the difference.

Water and thermal consumption for the ozone system are calculated based on typical gallons per pound of laundry and percentage of hot water used per cycle. This data, together with machine rated capacity and estimated percentage of capacity for the average load are then annualized. The annualized data serve as the baseline consumption. Savings are based on typical percentage reduction in both cold and hot water, and thermal savings from the hot water reduction.

The savings for this ECM are a result of reduced flush/flow rates and changes in operational parameters (limiting run time, operating temperatures).

Sample Operation and Maintenance Savings Calculations

Based on the current information available there are no O&M savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option C as defined by the International Performance Measurement and Verification Protocol (IPMVP). The savings determination will be through comparisons of the baseline utility bills to post construction utility bills.

Verification for the ECM's 1.A2, 2.A2, 3.A2, 4.A2, 5.A2, and 6.A2 will be accomplished through direct comparison of the pre and post construction utility bills, with an adjustment for monthly weather variations and any necessary outdoor air adjustments for code compliance. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage of total utility use that is affected by HDD which is also considered. The baseline energy use has been provided for each building, along with a more detailed M&V description in Schedule L.A2. Outdoor air (OA) adjustments may be required in situations where the existing, measured OA is less than the minimum required by code for the facility. These adjustments utilize standard bin data analysis and industry standard engineering calculations to determine the adjustments and are further explained in Schedule L.A2.

Commissioning Process

The ICON Shower System and Male Inmate Laundry Ozone System will act as independent systems and not be a component of a larger integrated system, the appropriate level of commissioning is level 2. Level 2 commissioning is intended to include comprehensive pre-start check up and testing to ensure the contractor meets the contractual requirements to produce a fully functioning independent system.

Level 1 is the proper level of commissioning for the Low Security High Flow Toilet and Urinal Upgrades. Level 1 commissioning basically involves visual inspection of the installation.

Equipment Training

Two (2) hours of training has been proposed for this ECM. The training will include, but not be limited to fixture identification, control sequences and base programming, and general maintenance.

Warranty Information

There is a warranty for a period of 1 year on installation and workmanship.

ECM 7.A2 – Annex Central Mechanical Plant

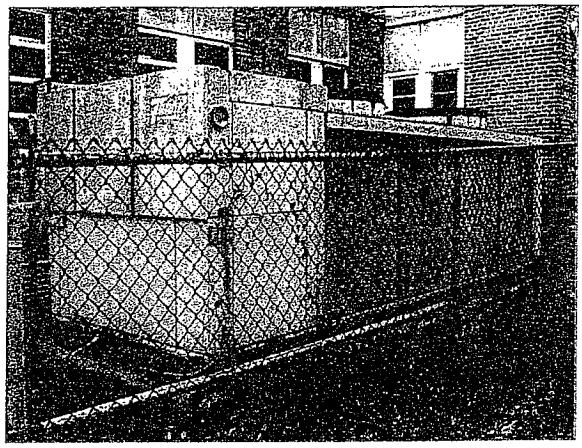
Areas Implemented

✓ Annex

Proposed Solution

Chiller Replacement

Currently the Annex cooling is provided by (2) Trane air cooled chillers and (1) building loop pump. The chillers are in poor condition and are exhibiting many maintenance concerns. The chillers are set up as a lead/lag system but often run simultaneously. Also, the existing isolation valves for winterization do not hold and there is no heat trace on the exterior piping creating concern over pipe freezing. Insulation of the exterior pipe is also in poor condition, with damage and missing sections.



Existing Trane packaged air cooled chiller (typical of 2)

McClure Company is proposing to replace the (2) Trane air cooled packaged chillers in kind with (2) new air cooled, scroll compressor packaged chillers as manufactured by Trane or approved equal. New chillers will be 60 nominal tons with freeze protection. Additionally McClure Company is proposing to repair or replace the associated exterior piping, insulation, and isolation valves. One (1) new chilled water pump (creates a lead/lag configuration) will be part of the new central plant discussed below.

Central Plant

The Annex currently does not have a central equipment plant and only produces chilled water via the above described air cooled chillers. Heating is provided from the Nursing Home complex via steam that is sent through a heat exchanger located in a connecting steam tunnel then piped to the (1) 5 HP building loop pump. Chilled water is sent from the (2) air cooled chillers through (1) 7.5 HP building loop pump. The existing configuration is a 4 pipe system. The pumps are in operable condition, but lack redundancy. Currently the Annex reimburses the Nursing Home for use of the steam and water supply provided.

McClure Company is proposing to install new equipment to create a separate central plant for the Annex and disconnect the heating service from the Nursing Home. Two (2) new gas fired PK MACH C2500 condensing boilers will be installed in the former 911 Battery Room/Morgue and piped to the existing 5 HP pump. An additional, new 5 HP pump will be installed to provide redundancy and will include a variable frequency drive (VFD) for balancing. The VFD will allow for future variable pumping depending on valve configurations in the Annex and changes made during any future renovations. Additionally a new 7.5 HP chilled water pump will be installed for redundancy, also with a VFD for balancing purposes within the project, but again allowing for future changes. The steam line currently feeding the heat exchanger will be valved off as close to the Nursing Home central steam plant as possible and the line capped at the heat exchanger. The piping will be modified to incorporate the new condensing style boilers as the heat generation source. A new gas service and account will be provided for the Annex. The (3) existing steam unit heaters will also be replaced in kind with (3) new hot water units to accept the new heating medium. Additionally (5) new hot water unit heaters will be installed to replace steam convectors located throughout the facility.

The new central plant will also receive a central plant control system. The system will allow for future expansion to terminal units and spaces, however, a holistic control retrofit is not part of this proposal. McClure is proposing a new automation system manufactured by Schneider Electric (formerly Invensys Controls) supplied through NRG Controls. The new automation system will act independent of all other control systems

and its specific purpose will be for the new Annex building mechanical upgrades. The new system is also capable of integration into the new Prison automation system, and the Government Center automation system. This would allow an operator to quickly review operation of all three buildings.

The new automation system will include a new graphical interface with internet capability. A graphical interface allows an operator to view the complete operation of individual components (chilled water system and hot water system) of the mechanical system as it occurs, making diagnosis of problems a much easier task. If remote access is allowed an assigned operator could check on the mechanical system from anywhere with internet access. The system is also very secure only operators with proper clearances, which are programmed into the graphical interface server, will be allowed access. Remote access can also be denied to all operators for security reasons.

The automation system will provide control only of the mechanical system upgrades which are a new hot water system and a new chilled water system. There will not be new controls on existing to remain terminal units. Following the equipment list is a points list for each piece of equipment.

Description	Quantity
Hot water System	1
HW Pump with VFD	2
Condensing Boiler	2
Chilled water System	1
New chiller	2
Chilled Water pumps with VFD	2

System Description

Hot Water System	AI	AO	DI	DO
Hot water supply temperature	x			
Hot water return temperature	x			
Hot water temperature set point		x		
New condensing boiler				
Stop/start				x
Status			x	
Alarm			x	
Modulating output		x		
Hot water pumps:				
Stop/start				x
Status			x	
Speed control (VFD only)		x		

Chilled Water System	AI	AO	DI	DO
Chilled water supply temperature	x			
Chilled water return temperature	x			
Chilled water set point		x		
Chiller stop/start stage 1				x
Chiller stop/start stage 2				x
Chiller status stage 1			x	
Chiller status stage 2			x	
Chilled water pump 1 stop/start				x
Chilled water pump 1 status			x	
Chilled water pump 1 speed control	x			
Chilled water pump 2 stop/start				x
Chilled water pump 2 status			x	
Chilled water pump 2 speed control	x			

The general scope of work will include:

- ✓ Removal of (2) Trane packaged air cooled chillers.
- ✓ Installation of (2) new Trane packaged air cooled chillers (or approved equal).
- ✓ Installation of (2) new pumps, (1) for HW and (1) for CHW, along with (1) VFD per pumps for balancing.
- ✓ New DDC controls for central plant equipment.
- ✓ Full system startup and commissioning.

General Benefits

- ✓ Energy Savings
- ✓ System Reliability
- ✓ Increased Control

Operating Hours

Typical operating hours for this ECM are 8,760 hours per year given the retrofit to all central plant equipment.

Energy Savings

Energy savings associated with the Central Plant Upgrades are calculated using a custom, 8,760 hour spreadsheet analysis based on facility data, operational parameters, and equipment efficiencies. These inputs are analyzed using ASHRAE standard engineering calculations and bin weather data for the specific project location to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including efficiency increases, system architecture changes, and increased control of operation. The difference between the two analyses is the resulting energy savings for this ECM.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results in then further analyzed to make a determination for the difference.

The savings for this ECM are a result of increased efficiency of the chillers and control of the new central plant. Given there is no existing heating central plant, there are no savings, however, the Annex will no longer require the operational assistance of the Nursing Home Central Plant, and no longer be required to purchase steam as such.

Sample Operation and Maintenance Savings Calculations

We were not able to quantify any operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option B as defined by the International Performance Measurement and Verification Protocol (IPMVP). Option B savings are determined after the project completion by short term or continuous measurements taken up to one year following the completion of the installation and compared to a pre-project baseline.

The metering will include measurement of the burner efficiency and operation post installation. The boiler efficiency will be used to determine energy use. A more detailed explanation can be found in the M&V section in Schedule L.A2.

Commissioning Process

Although the HVAC system will undergo only minor upgrades in terms of the central plant equipment, and it will interface with the new control system, and therefore the commissioning process must be of the highest level

and level 3 commissioning is proposed for the Mechanical Room Upgrades and Constant Volume AHU Retrofits. Level 3 commissioning is the most detailed and exhaustive application of the commissioning process. Level 3 commissioning is meant to ensure system operation, including all control sequences, is adequately checked and that functional performance is achieved in all respects.

Before any functional testing will occur, the contractor will perform all pre-start up checks and tests.

Level 3 commissioning involves a visual inspection of the installation, system start up check and documentation of start-up procedures, functional testing to ensure integrated operating systems function as designed, customer attendance and sign off that all functional tests have been completed and the system operation meets expectations.

The commissioning plan can be found in Attachment C.A2.

Equipment Training

A total of twenty (12) hours of training is proposed for all new mechanical equipment in ECM's 7.A2 and 8.A2. The training will include, but not be limited to: routine maintenance requirements, general operation, and system locations/warranty.

Control training in the amount of twelve (12) hours is proposed for ECM 7.A2. Eight (8) hours after completion and an additional four (4) hours between 6 months and 1 year after completion as a refresher and demonstrate the control strategy for the energy savings during the weather season at that time. Training will include, but not be limited to: control strategy, graphical interface, and collection of historical data.

Warranty Information

There is a warranty of 1 year on installation and workmanship. The labor warranty includes properly functioning control sequences.

ECM 8.A2 – Nursing Home Mechanical Upgrades

Areas Implemented

- ✓ Nursing Home Laundry and Dietary Facility

Proposed Solution

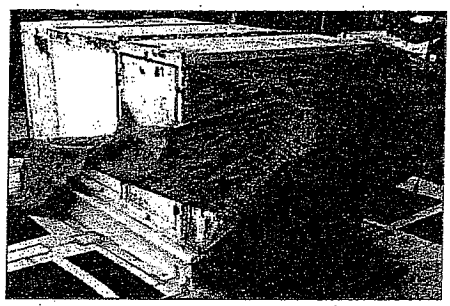
Rooftop Unit Replacement

During site survey's McClure Company discovered (2) roof top units (RTU's) located on the Dietary and Laundry buildings that are in need of immediate replacement.

A 15 ton, cooling only unit, that serves the Café, was found to have severely damaged fins on the coils to point of maintenance concern over the operation of the unit. This unit will be removed and replaced with a new gas fired, 15 ton RTU as manufactured by Trane, Voyager model, or approved equal.

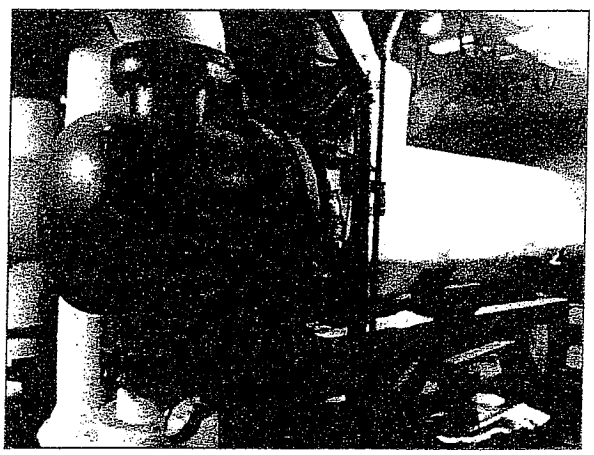
Failing Dietary Unit

On the Laundry Building, a 9,800 CFM Reznor make up air unit (MUA) has exterior damage requiring the maintenance staff to cover the unit with a tarp to prevent leaking from precipitation. The unit provides only outdoor air and does not condition (heat or cool). A new rooftop, curb mounted, MUA unit, as manufactured by Greenheck or approved equal, will be installed in place of the failing Reznor unit.


Failing Laundry Unit

Steam Pipe and Valve Insulation

During site survey's McClure Company discovered various areas within the central plant and steam tunnels where insulation was missing or damaged causing heat radiation and lowering the effective efficiency of the steam central plant. Additionally there were valves located in steam converter rooms and the central plant that were un-insulated causing heat radiation in the space and lowering the effective efficiency of the central plant.


Steam converter with damaged and missing insulation

In all, approximately 500 linear feet (LF) of steam piping, ranging in size from ½" to 8" and in lengths of 2 LF to 100 LF, has been damaged or is missing. These areas will receive new insulation, which at minimum will be the same R value as existing.

McClure Company is proposing to install removable insulation jackets on all application steam system components that are currently missing insulation. As a result of our survey, there are approximately (9) valves and strainers located in steam converter rooms and the central plant that will require insulation jackets. Also, one of the steam converters is missing insulation and will receive new insulation as part of the jacket installation. Each insulation jacket is designed and engineered for its specific application. Component type, steam pressure, and application are all accounted for when designing each jacket. They are constructed of high density insulation filler with a fully encapsulated outer jacketing. The outer jacket is double sewn and bound at the closing seams. The entire jacket is fully removable without compromising the insulation value within the jacket

General Benefits

- ✓ Energy Savings
- ✓ Increased Safety

Operating Hours

Operating hours for this ECM are based on 8,760 hours per year.

Energy Savings

Energy savings associated with this ECM are based on a custom hourly spreadsheet analysis developed specifically for this ECM. Individual valve size, type and operating pressure are input into spreadsheet. Savings are calculated based on approved industry heat loss values. The savings will be verified with the M&V methodology described below.

Sample Operation and Maintenance Savings Calculations

We were not able to quantify any operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The determination of steam savings and measurement and verification process will incorporate option A methods. Option A includes short term metering along with stipulated variables. The stipulated variables will include the hours of operation, thermal conductivity of the valves and insulation. The measured variables are temperature difference, area of the valve. The measured and stipulated variables are used in an equation to determine the decrease in heat loss from the steam valve.

The savings are the reduced heat loss resulting from insulating the steam valves. Short-term metering will measure the ambient temperature of the steam tunnels and mechanical rooms along with the surface temperature of the valve both before the steam jacket has been installed and also after the steam jacket was installed.

The following are calculations for determining energy and demand savings:

$$BTU\ Savings_t = (length_{pipe}\ or\ quantity_{fixture} \times Q_a \times hours\ of\ operation\ ) \div Boiler\ Efficiency$$

Hours of Operation = The stipulated operating hours will be used for both the baseline and post-installation energy calculations.

Where:

$BTU\ Savings_t$ =	BTU savings realized during the post-installation time period *t*
$length_{pipe}$ =	Length of un-insulated pipe found during initial survey
$quantity_{fixture}$ =	Quantity of fixture requiring insulation jacket such as a valve or strainer
Q_a =	Heat loss of the specific pipe size or fixture in question
Hours of Operation =	total number of post-installation operating hours (assumes number is the same before and after the lighting retrofit) for usage group
Boiler Efficiency =	Assumed efficiency of central plant mechanical system providing steam to the components of the usage group.

Commissioning Process

The new RTUs will act as an independent system and are not a component of a larger integrated system to be retrofit, therefore the appropriate level of commissioning is level 2. Level 2 commissioning is intended to include comprehensive pre-start check up and testing to ensure the contractor meets basic contractual requirements to produce a fully functioning independent system.

Level 1 is the proper level of commissioning for the steam pipe and valve insulation. Level 1 commissioning basically involves visual inspection of the installation.

The commissioning plan can be found in Attachment C.A2.

Equipment Training

A total of twenty (12) hours of training is proposed for all new mechanical equipment in ECM's 7.A2 and 8.A2. The training will include, but not be limited to: routine maintenance requirements, general operation, and system locations/warranty.

Warranty Information

There is a warranty of 1 year on installation and workmanship.

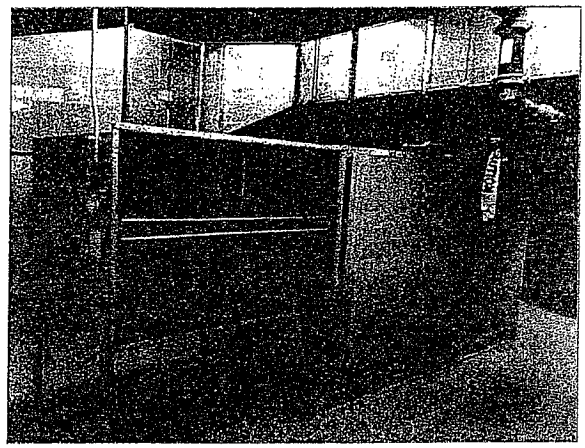
ECM 9.A2 – Judicial Center Recommissioning

Areas Implemented

- ✓ Judicial Center

Proposed Solution

Garage Make Up Air Corrections



Garage MUA unit (typical of 2)

During site survey's McClure Company discovered issues with the existing make up air (MUA) units serving the Judicial Center parking garage. Issus with maintaining ventilation and system operation were found, with one unit unable to operate without alarming and disabling due to high amperage. Several factors play a role in the problematic operation of the units and have been reviewed by McClure Company.

McClure Company is proposing to remove (2) MUA units supply air fan motors and replace them with (2) premium efficiency motors and VFDs. A volume damper will be installed on the discharge ductwork. This will allow for modulation of the fan motor to better serve the garage space and keep the system from alarming due to high amperage on the fan motors. Also proposed is a new inline exhaust fan to provide minimum required exhaust air from the garage during periods of low/no occupancy. The exhaust fan shall be controlled by new occupancy sensors within the garage. The MUA VFDs shall be interlocked, for low speed, with the new exhaust fan and, high speed, with the existing inline exhaust fans to provide the necessary ventilation required by code.

The general scope of work will include:

- ✓ Remove (2) supply air fan motors from existing MUA-B-1A and MUA-B-1B.
- ✓ Install (2) new premium efficiency 30 HP motors with VFDs for existing MUA-B-1A and MUA-B-1B.
- ✓ Install (2) new supply air volume dampers.
- ✓ Install (1) new inline exhaust fan.
- ✓ Install (8) new occupancy sensors.
- ✓ New/Recommissioned DDC controls for MUA units and new exhaust fan.
- ✓ Full system startup and commissioning.

Recommissioning

McClure Company proposes to complete the commissioning process as was intended with design to improve the mechanical system performance, and with the intent to reduce energy use. McClure Company will use NRG Controls as their subcontractor for the automation system commissioning. Additionally McClure Company will provide both air and water balancing service as part of the process to improve the performance of the mechanical system. NRG Controls and McClure Company have worked together several times to improve the energy use of a building mechanical system. The process starts with determining the current operating control sequences, making changes to the sequence that will both improve system operation and improve occupant comfort. The final step will be to document the control system operation meets the revised sequences. NRG will also provide training instruction once the commissioning process has been completed.

Commissioning Process

Engineering Analysis:

1. General review of original project documents for design intent
2. Review of equipment submittals (where available) to ensure compliance with design intent
3. Review of automatic temperature (ATC) sequences
4. Revise and implement automatic temperature (ATC) sequences
5. Compose and coordinate functional performance testing with controls contractor
6. The garage exhaust system will be re-designed to meet current code requirements

Field-testing services:

1. Airflow testing of all air handling units. The testing includes minimum and maximum ventilation rates, airside economizer operation and verification of proper static pressure set points for variable air volume roof top units.
    a. AHU-B-1,. AHU-1-1,. AHU-1-2,. AHU-2-1, AHU-2-2, AHU-3-1, AHU-3-2 g. AHU-4-1, AHU-4-2, AHU-P-1, AHU-P-2,. AHU-P-3, AHU-P-4, AHU-P-5
2. Water flow testing of hot water and chilled water systems both primary and secondary pumps along with the condensing water pumps. The testing includes pump flow and head measurement in the mechanical room with comparison to original design requirements. The system fill pressure will be measured and re-set if necessary so the hot water system has the proper fill and operating pressures.
    a. HWP-1,. HWP-2,. HWP-3,. HWP-4, HWP-5, CHWP-1 , CHWP-2, CHWP-4,CWP-2, CWP-3
3. A sampling of ten (10) fan powered mixing boxes (FPT) per level for a total of seventy (70) boxes that shall be balanced for design water and air flows.
4. The proper air flow coefficient will be determined and programmed for all fan powered mixing boxes (312 total)

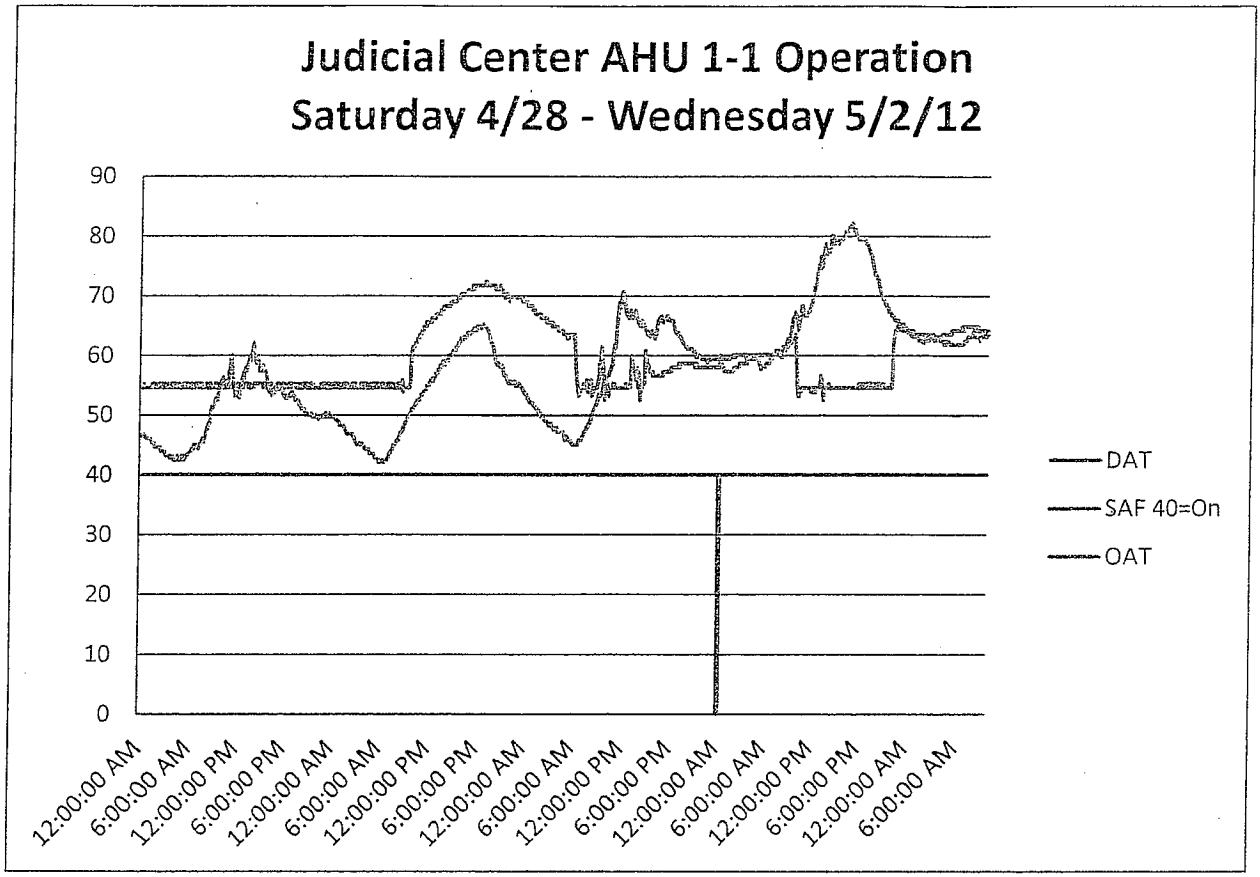
ATC functional performance testing:

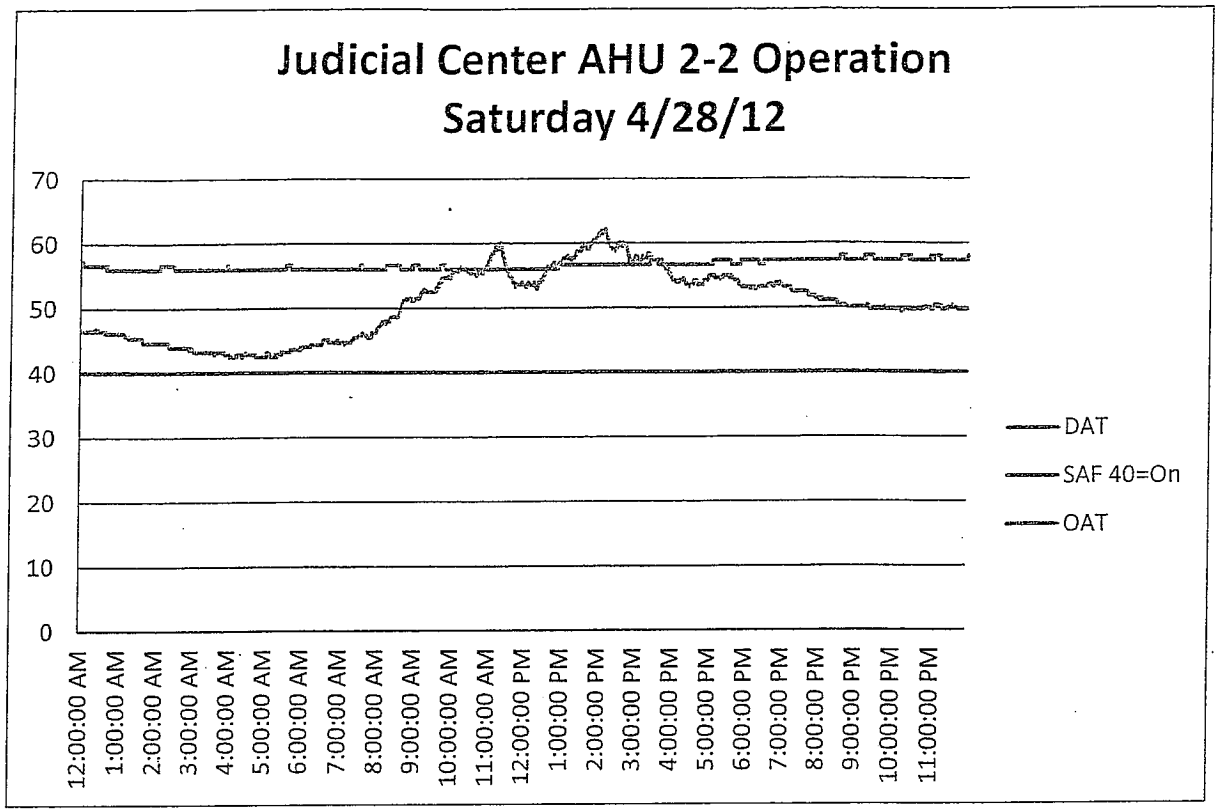
1. Calibration of a statistical sampling of thermostats serving fan powered mixing boxes to ensure accuracy
2. Loop tuning of all control programming sequences. Proper loop tuning provides steady control of system end devices and results in less occupant temperature complaints.
3. Verify accuracy of graphical interface. This will insure if operator is checking on a particular roof top unit, the operator is actually checking on that roof top unit.
4. Functional performance testing
5. Four (4) hours of operator training.

Once the commissioning process has been completed McClure Company will provide a written report fully disclosing our findings and any recommendations for corrective action. We cannot guarantee that we will diagnose every problem that exists in the mechanical system. We can assure York County the overall performance of the mechanical system will improve and energy use will be reduced as a result of the commissioning efforts. The county maintenance staff will also be trained to better utilize the automation system that was installed in the construction phase.

McClure Company has started this process as part of our study through use of data logging equipment using metering devices that record temperatures and operation. This information provides a solid base to evaluate the possibility of a recommissioning process. Further metering or trending using the control system may be

required throughout the process, however, McClure Company has collected metered data on (10) AHUs, (2) MUA units, primary and secondary HW pumps, primary and secondary CHW pumps, cooling tower #1 and #2, condenser water pump #1 and #2, chiller #1 and #2, and boilers #1 and #2, along with numerous space temperatures. Some examples are included below.




Judicial Center AHU 2-2 Operation
Saturday 4/28/12
70
60
50
40
30
20
10
0
12:00:00 AM
1:00:00 AM
2:00:00 AM
3:00:00 AM
4:00:00 AM
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
11:00:00 AM
12:00:00 PM
1:00:00 PM
2:00:00 PM
3:00:00 PM
4:00:00 PM
5:00:00 PM
6:00:00 PM
7:00:00 PM
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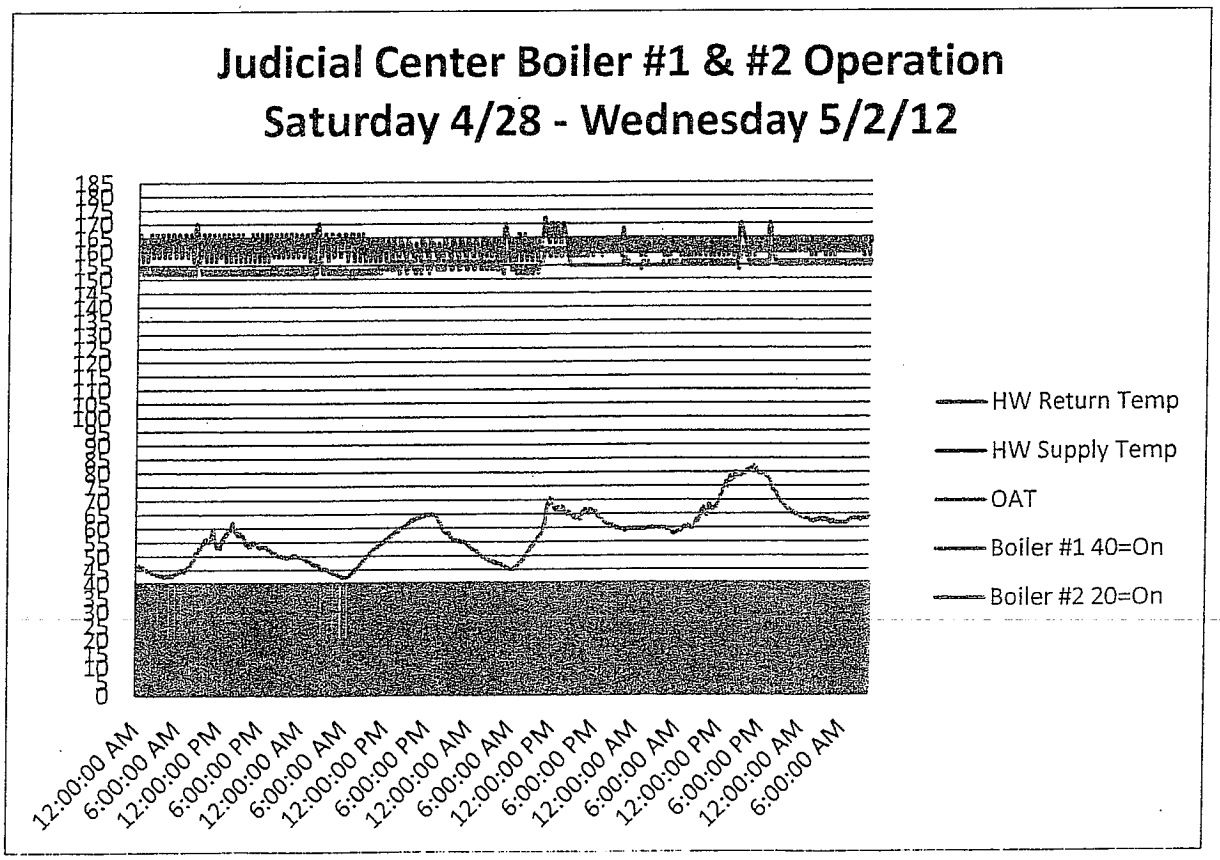
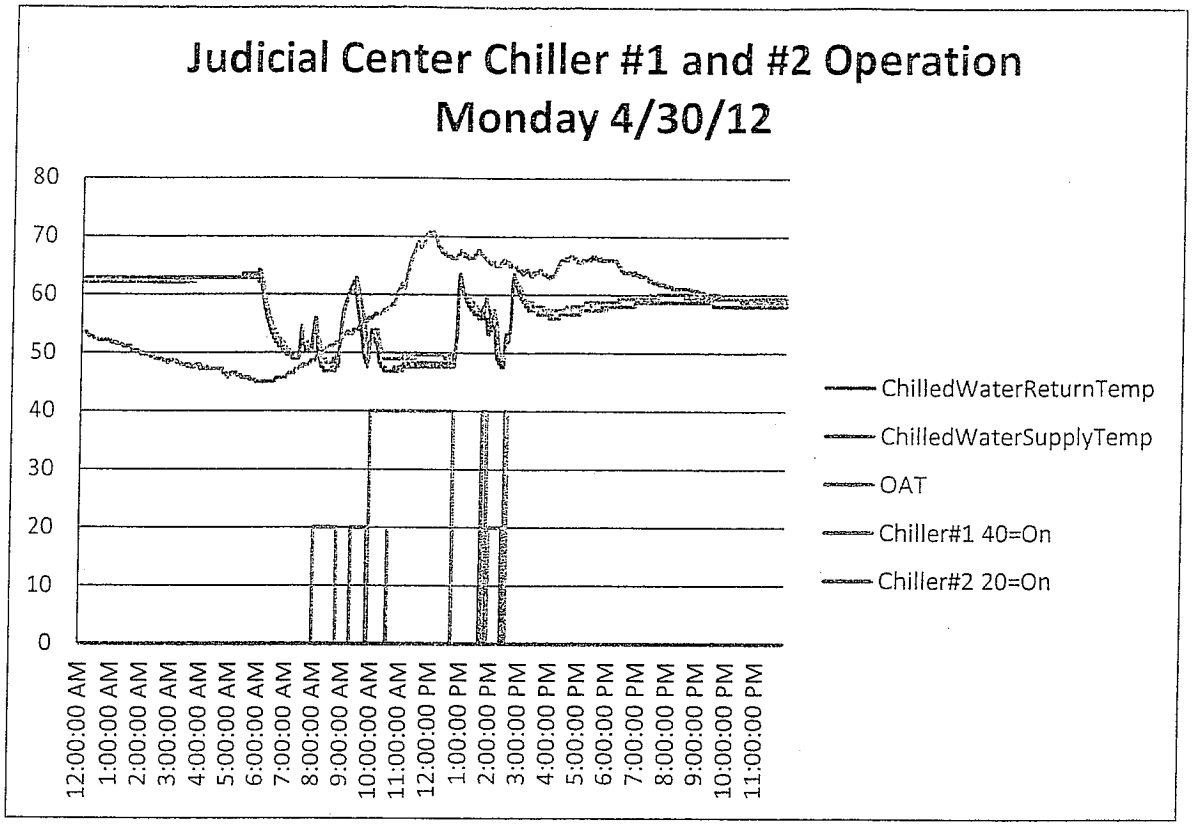
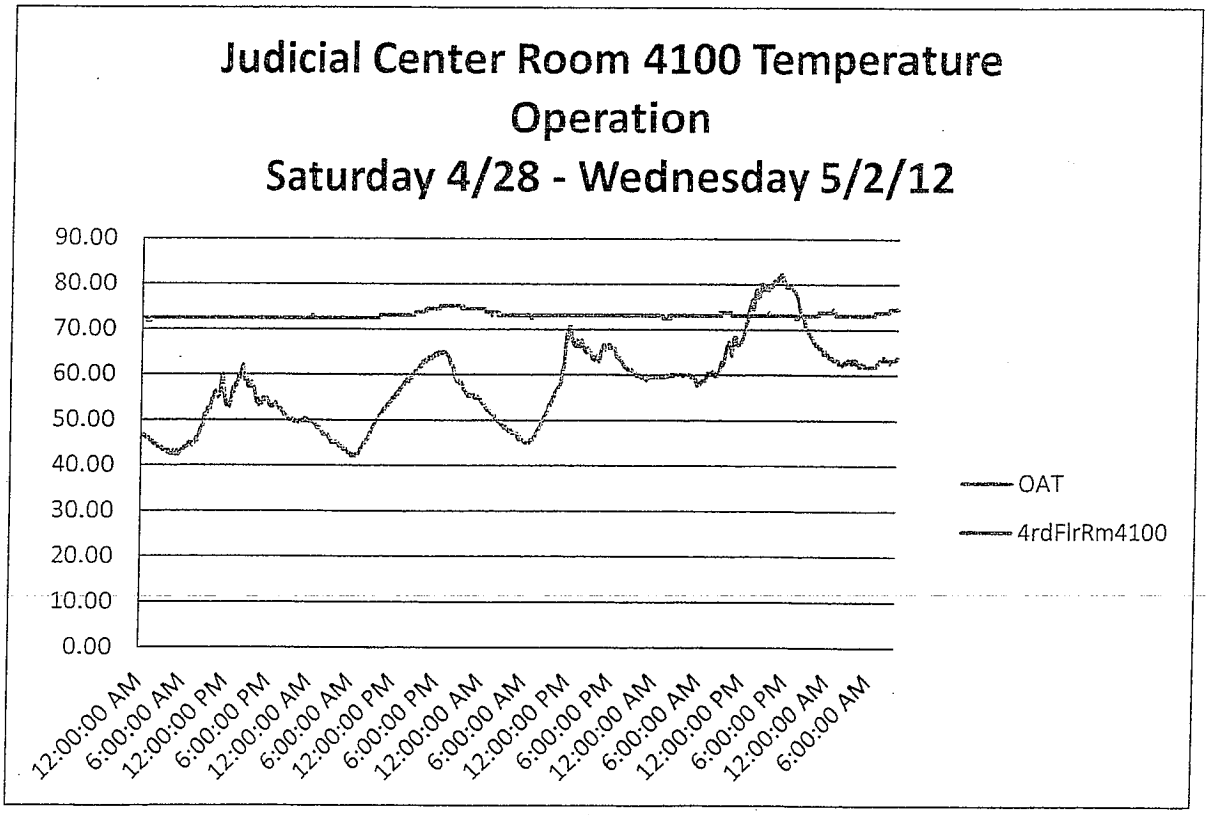
10:00:00 PM
11:00:00 PM
DAT
SAF 40=On
OAT


Judicial Center Boiler #1 & #2 Operation
Saturday 4/28 - Wednesday 5/2/12
12:00:00 AM
6:00:00 AM
12:00:00 PM
6:00:00 PM
12:00:00 AM
6:00:00 AM
12:00:00 PM
6:00:00 PM
12:00:00 AM
6:00:00 AM
12:00:00 PM
6:00:00 PM
12:00:00 AM
6:00:00 AM
12:00:00 PM
6:00:00 PM
12:00:00 AM
6:00:00 AM
12:00:00 PM
6:00:00 PM
12:00:00 AM
6:00:00 AM
HW Return Temp
HW Supply Temp
OAT
Boiler #1 40=On
Boiler #2 20=On


Judicial Center Chiller #1 and #2 Operation
Monday 4/30/12
80
70
60
50
40
30
20
10
0
12:00:00 AM
1:00:00 AM
2:00:00 AM
3:00:00 AM
4:00:00 AM
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
11:00:00 AM
12:00:00 PM
1:00:00 PM
2:00:00 PM
3:00:00 PM
4:00:00 PM
5:00:00 PM
6:00:00 PM
7:00:00 PM
8:00:00 PM
9:00:00 PM
10:00:00 PM
11:00:00 PM
ChilledWaterReturnTemp
ChilledWaterSupplyTemp
OAT
Chiller#1 40=On
Chiller#2 20=On


Judicial Center Room 4100 Temperature Operation
Saturday 4/28 - Wednesday 5/2/12
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
12:00:00 AM
6:00:00 AM
12:00:00 PM
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OAT
4rdFlrRm4100

General Benefits

- ✓ Energy Savings
- ✓ Occupant Comfort
- ✓ Increased Control

Operating Hours

Operating hours for this ECM are based on 8,760 hours per year, however, changes in occupancy time periods will be part of the recommissioning. These schedules will be discussed with the facility manager to better fit the schedules to building occupancy.

Energy Savings

Energy savings associated with the recommissioning of the Judicial Center are calculated using a custom spreadsheet analysis based on facility data, operational parameters, and equipment efficiencies. These inputs are analyzed using ASHRAE standard engineering calculations and bin weather data for the specific project location to develop an existing or base scenario that resembles current operating conditions. The analysis is then adjusted to the new, proposed operating conditions, including efficiency increases, system architecture changes, increased control of operation, and standardization of facility set points. The difference between the two analyses is the resulting energy savings for this ECM.

McClure Company utilizes the custom spreadsheet analysis in order to more effectively calibrate to the existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, any discrepancies in saving results are cross checked with TRACE 700, DOE eQuest, or industry standard engineering checks. Any major differences between the two results in then further analyzed to make a determination for the difference.

The savings for this ECM are a result of corrections to building occupancy schedules, balanced operation, and utilization of designed system component as intended.

Sample Operation and Maintenance Savings Calculations

We were not able to quantify any operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for this ECM will be Option C as defined by the International Performance Measurement and Verification Protocol (IPMVP). The savings determination will be through comparisons of the baseline utility bills to post construction utility bills.

Verification for the ECM's will be accomplished through direct comparison of the pre and post construction utility bills, with an adjustment for monthly weather variations and any necessary outdoor air adjustments for code compliance. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage of total utility use that is affected by HDD which is also considered. The baseline energy use has been provided for each building, along with a more detailed M&V description in Schedule L.A2. Outdoor air (OA) adjustments may be required in situations where the existing, measured OA is less than the minimum required by code for the facility. These adjustments utilize standard bin data analysis and industry standard engineering calculations to determine the adjustments and are further explained in Schedule L.A2.

Commissioning Process

Since the HVAC system will undergoing a complete reconfiguration of the control sequences and operating schedules, the commissioning process must be of the highest level and level 3 commissioning is proposed for the Mechanical Room Upgrades and AHU Replacements. Level 3 commissioning is the most detailed and exhaustive application of the commissioning process. Level 3 commissioning is meant to ensure system operation, including all control sequences, is adequately checked and that functional performance is achieved in all respects.

ECM 10.A2 – Building Envelope

Areas Implemented

- ✓ Prison
- ✓ Annex
- ✓ Nursing Home

Proposed Solution

McClure Company is proposing to reduce the amount of infiltration air and increase critical insulation areas for each of the buildings listed above. Infiltration can be defined as unregulated outside air entering a building unintentionally. This air must be treated (heated or cooled) by the building's heating or cooling system to maintain acceptable indoor temperatures. Even the smallest cracks / penetrations can have a significant impact on the annual heating and cooling energy consumption.

Each building listed above was fully surveyed to leverage the savings opportunities available in limiting infiltration. Common savings areas include door weather stripping, air sealing roof wall interfaces, and air sealing interior to exterior penetrations.

Prison Building Envelope

The Prison provides an opportunity for reduced infiltration through installation of new door weather stripping, sealing of roof top exhaust fans, and sealing of roof/wall interface. Nearly all exterior doors at the facility are in need of full weather stripping replacement and/or door sweeps, including single, double, and overhead doors. New weather stripping and sweeps will be installed on approximately (37) doors and (1) overhead door. The weather stripping and sweeps will be fitted to conform to aesthetics using Q-lon weather stripping with like colors.

Roof top exhaust fans typically exhibit gaps between the internal ductwork and the fan curb level with the roof deck that allows unintentional conditioned air to be drawn out through the fan, as well as allowing for infiltration. Approximately (77) roof top exhaust fans will be removed and the gaps air sealed. The hoods will then be reinstalled and all screws will be tarred to prevent infiltration at the mounting locations.

Roof/wall interface gap

Numerous areas throughout the facility present an opportunity to seal the roof/wall interface. Several roof types exist at the facility, with gaps between the roof and wall ranging from 1"-3". These areas include gaps above and below spandrel beams that sits between the concrete block wall and the roof deck. There is approximately (4,405) linear feet of gaps, the majority of which will be sealed with 2 part closed cell spray foam. A 2" coating of foam will be applied to the gaps above and below the beam, effectively eliminating the air infiltration.

Various entry way soffits also show opportunities for air sealing. Various entry ways feature soffits with gaps ranging from 1" to 3" in width from the interior wall plane. Outside air infiltrates through fixtures and seams on the exterior deck into the plenum space. The soffits will be treated with a combination of foil face foam board and 1 part open cell spray foam. This will create an insulated wall at the openings to the soffit creating a thermal barrier between the outside air of the soffit and the interior space. The seams and gaps will be sealed with spray foam to add a complete air barrier.

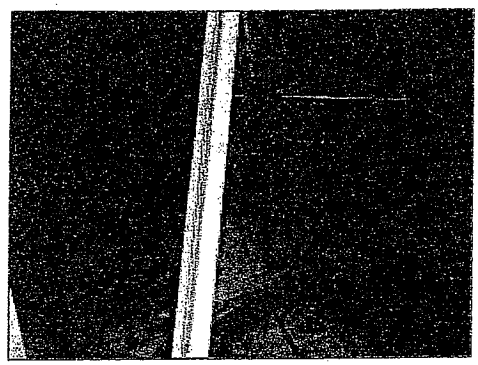
Annex Building Envelope

The Annex Building serves as administrative offices for various York County employees. This building is an early 1900's facility that was once a nursing home. The main areas identified for improvement include attic insulation door replacement, and door weather-stripping.

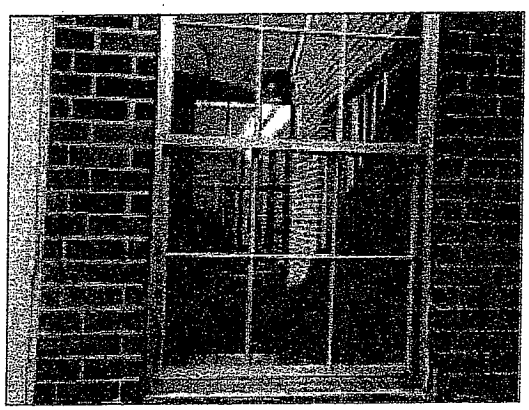
Failing exterior wooden door

Nearly all exterior doors at the facility are in need of full weather stripping replacement and/or door sweeps. New weather stripping and sweeps will be installed on approximately (5) doors and (2) overhead door. The weather stripping and sweeps will be fitted to conform to aesthetics using Q-lon weather stripping with like colors. Additionally, (32) doors require replacement. These doors are wooden construction that have served their useful life and are beginning to fail. Many doors have large holes or broken sections that allow for large amounts of infiltration. The doors will be replaced with new insulated steel doors conforming to current building code. The main double doors at the front of the building will be a decorative replacement, while secondary doors will be replaced with standard steel doors with weather stripping featuring Q-lon seals and aluminum carriers.

The main, two story center section of the building has an attic space above the top floor that has minimal fiber batt insulation in poor condition. The attic floor has never been properly air sealed and allow for air exchange from the attic to the conditioned spaces below. McClure Company is proposing to remove the fiber batt insulation and air seal the attic floor, including sealing penetrations with 1 component fire rated spray foam. The attic will then receive 15" of open blown cellulose insulation to achieve an R-50 thermal factor.



Attic insulation existing



Annex Window Replacement

Many of the existing windows at the Annex are single, metal frame, with worn or deteriorated weather stripping and exterior frame caulking. The units provide little thermal barrier. McClure Company is proposing to remove and replace approximately (246) window units and replace with new clear anodized finish, single hung, window units complete with high performance low "E" insulated glass. The new window units will be caulked with a standard color based on the frame selection.

Nursing Home Building Envelope

The Nursing Home also presents many opportunities to minimize infiltration, including door weather stripping/sweeps and roof/wall interface sealing.

Nearly all exterior doors at the facility are in need of full weather stripping replacement and/or door sweeps, including single, double, and overhead doors. New weather stripping and sweeps will be installed on approximately (12) doors, (8) slider/interior storm, and (1) overhead door. The weather stripping and sweeps will be fitted to conform to aesthetics using Q-lon weather stripping with like colors.

Numerous areas throughout the facility present an opportunity to seal the roof/wall interface. Several roof types exist at the facility, with gaps between the roof and wall ranging from 1"-3". These areas include gaps above and below spandrel beams that sits between the concrete block wall and the roof deck. There is approximately (425) linear feet of gaps, the majority of which will be sealed with 2 part closed cell spray foam. A 2" coating of foam will be applied to the gaps above and below the beam, effectively eliminating the air infiltration

General Benefits

- ✓ Energy Savings
- ✓ Occupant Comfort
- ✓ Aesthetic Improvements

Operating Hours

Operating hours for this ECM are based on 8,760 hours per year.

Energy Savings

Energy savings associated with this ECM are based on a custom spreadsheet analysis utilizing ASHRAE standard engineering calculations. McClure Company utilizes custom spreadsheet analysis in order to more effectively calibrate to existing conditions and determine individual ECM savings in more detail. When using these spreadsheets, all of our results are then cross checked with TRACE 700, DOE eQuest or industry standard engineering checks. Any major difference between the two results is then further analyzed to make a determination for the difference.

The savings are a result of reducing the infiltration of raw outside air into the building and sealing attic / occupied space thermal boundaries.

Sample Operation and Maintenance Savings Calculations

Based on our study, there are no operational or maintenance savings associated with this ECM.

Measurement and Verification Methodology

The M&V methodology for the Building Envelope Upgrades will be Option D as defined by the International Performance Measurement and Verification Protocol (IPMVP). Option D involves the use of computer simulation software or industry standard energy calculations to predict facility energy use. A more detailed description of the software and energy calculations is available in the M&V section of this report.

Verification for this ECM will require adjustments for monthly weather variations. The weather comparison is done monthly, as a ratio to the current months Heating Degree Days (HDD) to baseline month's HDD. There is also a percentage of total utility use that is affected by HDD which is also considered. A more detailed description of this methodology can be found in Schedule L.A2.

Commissioning Process

Level 1 is the proper level of commissioning for the building envelope upgrades. Level 1 commissioning basically involves visual inspection of the installation.

Equipment Training

There is no proposed training for this ECM.

Warranty Information

There is a warranty for a period of 1 year on installation and workmanship

ATTACHMENT B.A2 – 3 YEAR SERVICE AGREEMENT

GENERAL

A 3 year mechanical service agreement has been included as part of this Guaranteed Energy Services Agreement (GESA). The mechanical service agreement will provide the County of York with ongoing, comprehensive scheduled maintenance. This agreement will be implemented, scheduled, administered, monitored and kept current by McClure Company. The service activities will be planned and scheduled on a regular basis by our comprehensive maintenance scheduling and system based on manufacturers' recommendations, equipment location, application, type, run time and McClure Company's expertise. The County will be kept informed of the agreement's status on a continuing basis utilizing detailed Service Reports, presented after each service visit for the County's review, approval signature and record.

3 YEAR SERVICE AGREEMENT

Upon execution of this Amendment No.2, the existing service agreements with McClure Company with a current combined value of $313,258.50, (see cost breakdown in Table B.A2.1) will become null and void. It will be replaced with a new 3 year service agreement designed to 1) include the same level of service as the aforementioned agreement, 2) incorporate service for new major equipment being installed as part of this Amendment No.2 and 3) provide for new service not previously covered under the existing service agreement.

Table B.A2.1 - Existing Service Agreement Cost Breakdown

Facility	Equipment	Contract Type	Value
Prison	HVAC	Full Service	$90,224
Prison	Controls	PM Only	$42,000
Government Center	HVAC	PM Only	$7,200
Judicial Center, 911 Center, Etc	HVAC / Controls	Full Service	$173,834.50
		TOTAL	**$313,258.50**

The revised service agreement inclusive to this Amendment No.2 will consist of that listed in Table B.A2.2.

Table B.A2.2 – New Combined Service Agreement Cost Breakdown

Facility	Equipment	Contract Type	Value
Prison	HVAC	Full Service	$83,676
Prison	Controls	PM Only	$38,000
Government Center	HVAC	PM Only	$7,200
Judicial Center, 911 Center, Etc	HVAC / Controls	Full Service	$164,820
Prison	Boilers	PM Only	$22,394
Annex	Boilers, Chillers, Controls	PM Only	$10,000
		TOTAL	**$326,090**

Refer to the end of this attachment for general scopes of work, equipment inventory lists, terms and conditions, exclusions and special conditions as they pertain to the equipment / systems listed in Table B.A2.2. **NOTE – REVISED SERVICE AGREEMENT DOCUMENTS NEED TO BE ADDED TO THIS ATTACHMENT PRIOR TO FINAL SUBMISSION AND EXECUTION.**

Annual Savings

The existing service agreement does not include equipment / controls at the Annex or boilers at the Prison. Therefore, the cost of these services, $10,000 and $22,394 for the Annex and Prison, respectively, must be added to the existing service agreement cost for an accurate comparison. When doing so, the total cost savings of the new service agreement versus existing is $19,562.50.

3 Year Service Agreement Cost

The Year 1 cost for the 3 year service agreement is $326,090 escalated at 3% per year. The annual escalated cost has been included in the project cash flow. See Schedule D.A2.

Service Agreement Modification

The new service agreement may be modified, at the County's sole discretion, to reflect a change in scope of work or type of coverage. For example, the coverage type for any building or equipment may be modified from PM Only to Full Service and vice versa. The scope of work may also be modified to include additional equipment or exclude equipment.

Renewal Option

At the end of the 3 year term, the County may opt to renew the service agreement, including scope of services and included equipment, for any num ber of additional years up to and including the 20th year of this Amendment No.2. The County may also opt to modify or terminate the Service Agreement at anytime during this Amendment No.2 term with 30 days written notice. Should the County decide to renew the Service Agreement, this Amendment No.2 may be revised to reflect the changes.